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CHICAGO

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TORONTO

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Can'dlefish", a food fish of the Smelt Family. It is a slender marine fish, about one foot in length, and is known especially for the excessive amount of fat which it carries. It ascends the Columbia River in the spring, and is there taken in large quantities for the sake of a medicinal oil, called eulachon oil, which is extracted from it in large quantities in factories of British Columbia. The fish receives the name of candlefish because a great number are dried and have wicks run through their bodies. The dried fish thus becomes a candle which burns as readily as candles made from tallow.

Can'dlemas Day, a feast of the Roman Catholic Church occurring on the second of February. It commemorates the presentation of Christ in the Temple and the purification of the Blessed Virgin. The name is derived from the fact that on that day lighted candles are borne in procession before mass. Also candles for the religious use of Catholics in their homes during the year are then blessed.

Candolle, Kahn"dole', Augustin Pyramus de (1778-1841), a Swiss botanist who introduced the present natural system of the classification of plants into the University of Montpellier, France, and so insured its speedy recognition. He was the author of an *Elementary Theory of Botany* and a comprehensive *Introduction to a Natural System of the Vegetable Kingdom*, which his son completed. His herbarium was one of the largest of his time.

Candy. The term *candy* is used in the United States to denote a large variety of sweets, whose chief ingredient is sugar. The usual method of making candy is to boil a quantity of sugar in water, to which a small amount of glucose is added until the sirup is thick and almost clear. The mass is either pulled by hand or machinery, or poured out upon marble slabs to cool, where it is worked by means of paddles, after which it becomes hard, white and nearly crystalline, ready to be cast into various forms and sizes. Sometimes candy is made by boiling the sirup in copper ket-

tles, with beaters or stirring paddles inside to make it white and hard. Vacuum pans are also used for evaporating the sirup at different temperatures for different candies.

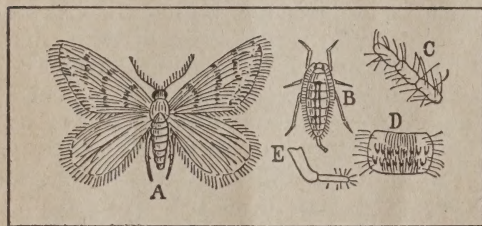
Hard candy is made by boiling in open kettles, the batches being mixed and rolled out by hand until they become the size of the desired stick, after which they are cut into suitable lengths. Rock candy is made and fruits and nuts are sugared by allowing the sugar to crystallize when boiling, and by pouring the sirup over the fruit or nuts, which are held suspended on strings running through a tin box and kept in a heated chamber at a temperature of about 100° F. Marshmallows are cast in cornstarch molds, like some varieties of candy known as liqueurs, in which a flavored sirup is dropped into molds impressed in dry starch, whereby a crust of sugar forms on the outside, the interior remaining liquid or moist.

The simplest form in which candy is made is the lozenge, which consists of finely-ground sugar, mixed with dissolved gum to form a dough, which is rolled into sheets of different thickness and stamped out in different shapes by cutters. Afterwards they are allowed to dry in a heated room. They can be colored or flavored to suit, and are sometimes made heart-shaped, with mottoes printed upon them. Coconut candy is made from the white meat of the nut, which is sliced and boiled in a kettle with the sugar and water until the mass is sufficiently cooked. Afterwards it is placed on a marble slab and rolled down to a proper thickness with a cylindrical roller. Caramels are made of sugar and pure cream, carefully boiled together until of the proper consistency, and then poured on marble slabs to cool. Afterwards they are cut into shape and wrapped in paraffin paper. Sometimes chocolate is added to flavor them. In coating various creams, etc., with chocolate, they are dipped by means of a little wire spoon, after which they are placed on a piece of oilcloth and set in a frame to dry.

France produces an endless variety of fine candies, bonbons and confections under many names, but the so-called crystallized fruits, those covered and impregnated with crystallized sugar, are especially esteemed. Machinery is used in the United States in many operations of candy making, and the coloring matters are generally free from deleterious and poisonous substances, as the pure food law compels manufacturers to use pure materials.

Canes, *Ka' neez*, Major, or The Great Dog, a constellation south of Orion and easily located by the bright star Sirius, or the Dog Star. The constellation also contains a number of other bright stars, making it one of unusual brilliancy.

Can'kerworm", a harmful moth of the Geometrid Family, which is very destructive to apple trees and elms. The female is a wingless insect, having a small gray body and long legs, thus re-



CANKERWORM

A, moth; B, pupa; C, larva; D, enlarged segment of the abdomen; E, ovipositor.

sembling a spider rather than a moth. The male has two pairs of ashy-gray wings, the forepair of which have three broken, brown lines which lie between an outer, white line and the body. At the tip of the wing is a short, oblique, black mark and at the edge a longer black line. The female comes out of the ground from February to April to lay her masses of eggs in crevices in the bark of the trees. The young caterpillars, which are slender worms, cling to the limb by their forelegs and extend the body into the air to simulate a twig. If the branch is jarred they spin a deli-

cate thread and cling by it until the danger is passed. In June or July they descend to the ground, burrow to the depth of a few inches and change to a chrysalis or pupal state.

The cankerworm is exceedingly harmful in its caterpillar stage. It feeds upon the bark and foliage of a tree and ultimately causes its death. When this pest infests apple orchards, it is kept down with comparative ease by spraying the trees with arsenical poisons. Elms, which they also infest, are not easily sprayed because of their size, and are rarely so carefully tended as are fruit-bearing trees. If in February a roll of cotton wadding is tied about the tree and over this a band of tarred paper, treated with a mixture of thick printer's ink and car-wheel oil, is fastened, the females will be unable to pass and to ascend the tree to deposit their eggs. The cotton wadding fills up crevices of the bark and prevents the moth from crawling behind the paper. A spray of Paris green or arsenate of lead is efficacious in destroying the full-grown insects or the caterpillars. See INSECTICIDE; CHICKADEE.

Can'ing, a process of preserving vegetables, fruits, fish and meats by enclosing them in air-tight cans. Nicholas Apput, a Frenchman, discovered this process in 1795, and it was introduced into the United States in about 1815. The preservation of perishable substances by canning depends upon the destruction of the bacteria which cause fermentation, and preventing these bacteria from again entering the substance. The first is accomplished by heating the substance to a temperature above the boiling point of water, and the second by sealing the cans while hot so that they are made air-tight. The original purpose of canning was to preserve food for long sea voyages, etc., but now the process is used largely for preserving cooked goods as well.

In a canning factory the machinery includes the heating apparatus, boilers, coils, etc., for boiling and scalding the articles that are to be canned and for bleaching vegetables; the exhausting

pump for taking out the air from the cans before sealing; and the soldering apparatus for sealing the openings through which the air was removed. Many special devices and contrivances are employed profitably to handle large quantities with as little hand labor as possible, like peeling, slicing, cutting, etc. In canning peas machines take the peas from the pods and assort them into different sizes. Corn is cleaned from the silk, etc., cut from the cob, cooked and filled into the cans by mechanical means. In canning soups and other liquid materials, machinery is chiefly used, making it possible to obtain the greatest cleanliness.

Canning has become an important industry in the United States, and immense quantities of fish, oysters, meats, fruits and such vegetables as green corn, beans, peas and tomatoes are canned. Fresh and salt meats are preserved by canning in packing houses. Sardines, halibut and salmon are the fish most commonly found in cans. The canning of goods has made it possible to eat all kinds of fruits and vegetables at all seasons of the year without destroying the flavor, by preserving in sugar.

There are some tens of thousands of canning plants throughout the United States, employing over 2,000,000 people, including many children. The oyster and fish canneries are located in Maryland, Maine, Washington and Alaska. Fruit is canned in large quantities in California, New York, Illinois, Ohio and Virginia; beef, in Chicago, Omaha, Kansas City and St. Louis; while vegetables are canned in almost every state.

Canning, George (1770-1827), an English statesman and orator, born in London. While still in college his ability as a writer and speaker was above the average, and his first speech in Parliament in 1793 fulfilled the promise of his college days. In 1796 he became under-secretary of state. The following year he began the publication of a satirical political paper, the *Anti-Jacobin*. Canning held many important offices under his government, in which he rendered

valuable service, but the work for which he most deserves to be remembered was in connection with the abolition of the slave trade, the repeal of the Corn Laws and Catholic emancipation. In 1827, the year of his death, he was made prime minister.

Can'non, a heavy gun, or piece of ordnance, for use in navy or artillery. Cannon are of three classes, guns, howitzers (See **HOWITZER**) and mortars, depending upon the proportion existing between their bore, or caliber, and their length. In guns the length in proportion to caliber is greatest; in the howitzer, medium; in the mortar, least.

The history of cannon begins with their use in France in 1338, although they were in use before that time. The first cannon were made of wood, strongly bound with hoops; later iron bars were used instead of wood. Toward the latter half of the 14th century bronze was used, and a little later, cast iron. Breech-loading cannon were used in the 16th century, but gave place to muzzle-loading guns, because the more powerful explosives drove out the breech. In modern times the breech has been improved and breech-loading guns are again in use. In the time of Louis XII the cannon of France were named after the peers of the country. Charles V of England named 12 of their cannon after the apostles. Later, other names were given: as, royal, cannon throwing a projectile weighing 48 lb.; culverin, 18 lb.; demi-culverin, 9 lb.; falcon, 6 lb.; basilisk, 48 lb.; and siren, 60 lb. Still later they were designated by the weight of the projectile, as, 6-pounder, 12-pounder, etc. This form of designation still continues, and in addition there is the naming by weight of the guns, as, 25-ton, etc., or by caliber.

The process of manufacturing cannon begins with the making of the draft. This is submitted to the makers, who proceed to cast the central tube, which is then placed in the lathe, bored out and turned down, the turning and boring sometimes being done at the same time. The tube is then rifled by cutting a spiral

groove inside. This gives a whirling motion to the projectile when thrown. The tube is then placed in a device for shrinking it, by cooling it gradually in water. In the meantime a jacket has been made, into which the tube must fit very closely. While the tube is being shrunk this jacket is being expanded by means of hot air. When both are ready, after about four days, the jacket is placed in a vertical position, the tube is raised, by means of a crane, and lowered into the jacket, which is shrunk until the two fit almost as if cast in one piece; and then the hoops are shrunk onto the jacket. The largest gun in the United States artillery is a 16-inch seacoast, weighing 280,000 lb. It throws a projectile that weighs 2370 lb. to a distance of 21 m., reaching a height of 6 m. in its flight. The mortar is designed for high-angle firing. Seacoast mortars are placed in pits, four mortars to a pit and two pits to a battery. The pits are protected by parapets of sand, with concrete retaining walls. See ARTILLERY; NAVY.

Cannon, George Q. (1827-1901), a leader in the Mormon Church, born in Liverpool, England. In 1844 his family moved to Nauvoo, Ill., whence he went with the first settlers to Salt Lake City. In 1865-6 and again in 1869-72 he was a member of the Legislative Council of Utah; and from 1872 to 1881 he was a member of Congress. In 1872 a constitutional convention held in Salt Lake City chose him to present to Congress the constitution and memorial for the admission of Utah as a state.

Cannon, Joseph G. (1836-), an American lawyer and statesman, born at Guilford, N. C. After being admitted to the bar in Illinois, he was state's attorney for Vermilion County from 1861 to 1868. In 1873 he became a member of the House of Representatives, where he served continuously until 1913, except for the term 1891-93. He acted on many important committees, and was speaker of the House from 1903 to 1911. He was again re-elected in 1914. Mr. Cannon has been very influential in the

councils of the Republican Party and in national legislation.

Canoe, *Ka noo'*, a light, narrow boat, sharp at both ends, propelled by paddles or sails, or by both. Some American Indians made canoes with light frames of tough wood covered with birch bark. The frame of the Eskimo canoe is often partly of bone, while the covering is of sealskins, sewed with sinews. By them it is called a *kaiak*. Except for an opening above the boatman's seat, it is tightly covered. The modern canvas canoe was naturally developed from these Indian originals. Hollowed logs, known as *dugouts*, are also classified among canoes. Such were used by some American Indians, as they still are by the natives in parts of Africa. In Canada, logs more than 60 ft. long have been made into *dugouts*. The canoes now commonly used in the aquatic sports in England, Canada and America are made of oak, cedar, basswood, compressed paper and other materials.

Canova, *Kah no' vah*, Antonio (1757-1822), an Italian sculptor, born in the Province of Treviso, of a family of stone cutters. At the age of 24 he removed to Rome, where he spent the remainder of his life, achieving considerable fame and doing much to revive the art of sculpture in Italy. His work is remarkable for smooth finish, but is marked by a certain artificiality; and his influence was rather pernicious than otherwise. Among his works are *Perseus with the Head of Medusa*, *Hercules and Lichas*, *Psyche with a Butterfly*, *Dancing Nymphs* and *Theseus Slaying the Centaur*.

Canovas del Castillo, *Kah' no vahn del Kahn teel' yo*, Antonio (1828-1897), a Spanish statesman. Early entering politics, he first sat in the Cortes as a Liberal in 1852. He served as director-general of the administration from 1858 to 1861, was secretary of state and became minister of finance in the colonies, but his liberal tendencies caused his banishment before the revolution of 1868. Returning in 1869, he became leader of the moderate Conservatives, and between

1875 and 1897 was four times premier, alternating this office with Sagasta. In 1897 he was assassinated. Canovas was not only a statesman but a poet, essayist and historian.

Can'terbury Tales. See CHAUCER, GEOFFREY.

Cantigney, Battle of. Cantigney is a town in France about twenty-five miles south of Amiens. There American troops fought their first battle in the World War and won a decisive victory May 28, 1918. While not one of the great battles of the war, it was of vast importance because it demonstrated to friend and foe alike that American soldiers were the equal of any that Europe could produce. It was the first of a series of victories that cheered the allies, disheartened the Germans, and contributed much to the final result.

Can'ton, a city of China, situated in the Province of Kwangtung, on the Pearl River. A wall of brick surrounds the city, and 12 gates, closed and guarded at night, form the entrance. The streets, about 600 in all, are very narrow, but straight and long; the houses are generally only two stories in height. Interesting features are the temples, the most famous of which are those of the Five Hundred Gods and of Longevity, the Temple of the Five Genii and the Tartar City Temple; the pagodas, the government offices and foreign mercantile houses. Along the river for four or five miles are stationed boats and vessels, forming a floating city, in which reside almost constantly a great number of families. The chief industries include the manufacture of silk, cotton goods, glass, paper and sugar. A rich agricultural region surrounds the city. Population, estimated at 1,500,000.

Canton, Ill., a city of Fulton Co., 28 m. s.w. of Peoria, on the Illinois Central, the Chicago, Burlington & Quincy, the Toledo, Peoria & Western and other railroads. Electric interurban lines connect it with near-by towns. The town is situated in a fertile agricultural district, of which it is the market and supply point, and there are valuable deposits of

coal in the vicinity. The principal industrial establishments are manufactories of farming implements, chiefly plows, and cigars. In addition there are brickyards, tile factories, marble works, foundries, cigar-box factories, flour mills, broom factories and manufactories of machine-shop products, including mining equipment. Canton has a public library and Chautauqua grounds. The place was settled about 1832 and was first incorporated in 1849; it was chartered in 1892. Population in 1920, 10,928.

Canton, Ohio, a city and county seat of Stark Co., 60 m. s.e. of Cleveland, on Nimishillen Creek and on the Pennsylvania, the Wheeling & Lake Erie, the Baltimore & Ohio and other railroads. The city is connected by an interurban electric system with all the neighboring towns and cities within a radius of over 50 m. Meyer's Lake, adjoining the city, is an attractive summer resort. The surrounding country is agricultural, and wheat growing is important. Bituminous coal, limestone, potter's clay and clay brick are found in the vicinity. Canton is also a manufacturing city of considerable importance.

PARKS AND BOULEVARDS. The city contains many handsome residences and miles of well-paved and shaded streets. Nimisilla Park is the largest of the city parks. On Monument Hill, in West Lawn cemetery in a park of 26 acres, is a beautiful monument erected in memory of President McKinley, who lived in Canton. This memorial is built of granite, with a bronze statue of the President and sarcophagi containing the remains of President and Mrs. McKinley. Another monument commemorates the American soldiers of the Spanish-American War.

PUBLIC BUILDINGS. Among the most important buildings are the courthouse, city hall, Y. M. C. A. Building, Odd-fellows' Temple, Masonic Building, Auditorium, Federal Building, a number of banks, the United States Signal Service Station and the McKinley High School Bldg. There are a number of churches of handsome architectural design.

INSTITUTIONS. The educational institutions include 3 high schools, a public library, public and parish schools and several private schools. The city also contains the Aultman, Mercy and Ingle-side hospitals.

INDUSTRIES. The principal manufactures of the city include agricultural implements, iron bridges, watches and watch cases, hardware, cutlery, wagons and carriages, paving bricks, dental and surgical chairs, clay-working machinery, furniture, paint and varnish, roofing, steel cars, bookcases, safes, woolen goods, pottery, tiles, saddlery, stoves and sawmill machinery. There is also an extensive trade in grain, coal and farm and dairy products. Large paving-brick industries are located here.

HISTORY. Canton was first settled in 1805, incorporated as a village in 1822 and received a city charter in 1854. Population in 1920, U. S. census, 87,091.

Canute, Ka nute', (about 994-1035), King of England, Denmark and Norway. Sweyn, the father of Canute and King of Denmark, was forcing the conquest of England when he died. Canute continued his father's conquests and established himself in the north of England, but the southern part was held by Edmund Ironside until his death in 1017, whereupon Canute became sole ruler of England. Upon the death of his brother in 1018 he succeeded to the throne of Denmark, in 1028 he became King of Norway, and three years later Malcolm of Scotland admitted his supremacy. Upon his accession to the throne of England, Canute began to reign harshly, but soon after this he seems to have experienced a decided change of character, for during the rest of his life he was wise, kind and peace-loving. His powerful kingdom was built up around his own personality, and when he died it fell to pieces.

Canvasback, a bird of the Duck Family, about as large as a domestic duck (23 inches), and easily known by its rich chestnut-brown head and neck, black chest and shoulders and grayish back, sides and under parts. The female is a

uniform brown. The bulky nest is made of grass, in reeds or rushes in shallow water, is lined with down, and contains seven or eight olive-green eggs. The canvasback is frequently confounded with the red-headed duck, from which it may readily be known by the uniform reddish-brown crown, which is dusky in the canvasback. The canvasback is highly esteemed as a game bird, the flesh being delicately flavored, and this duck has been hunted to such an extent as to cause serious reduction of its numbers. It is found throughout the whole of North America, breeding from Colorado and Minnesota northward.

Can'yon, or Cañon, Kan' yun, a Spanish word meaning tube or funnel, hence applied by the Spaniards in America to the deep river gorges which occur at various places in the Rocky and Sierra Nevada mountains. The Grand Canyon of the Colorado and the canyons of the Yellowstone and of Yosemite Valley are famous for their magnificent scenery. See COLORADO, GRAND CANYON OF THE.

Caoutchouc, Koo' chook. See RUBBER.

Cap, a close-fitting covering for the head, worn by men and boys. It differs from the hat in having no brim; but it may have a short extension or visor in front to protect the eyes. It is commonly made of some soft material. The wearing of a cap was a sign of freedom among the Greeks and Romans of antiquity; and in recent times this practice has been symbolic of liberty. The French Revolutionists wore a red cap called the *bonnet-rouge*.

Cape Bret'on Island, an island of the Dominion of Canada, separated from the Peninsula of Nova Scotia by Chedabucto Bay and the narrow Gut of Canso. It has an area of 3120 sq. m., and contains the towns of Sydney, Port Hood, Arichat and Louisburg. Tourists are attracted by its picturesque scenery and it has become a favorite summer resort. Cape Breton is rich in minerals. The productive coal areas cover about 250 miles, and gypsum is found in many places. The lumber yield, especially of oak, birch,

pine and maple, is large, and iron, coal and fish are also exported. Originally in the hands of the French, the island was captured by the British in 1745, was permanently ceded to England in 1763, and is now a part of the Province of Nova Scotia.

Cape Cod, a prominent peninsula of Massachusetts, comprising nearly all of Barnstable County and extending between Nantucket Sound on the south and Cape Cod Bay on the north. The peninsula is a long, narrow, L-shaped strip of low, sandy land, being about 65 m. in length and from 2 to 10 m. wide. The vegetation is scanty, but the land is especially adapted to raising cranberries, which are grown in large quantities. Cape Cod is a popular summer resort. A ship canal connecting Cape Cod Bay with Nantucket Sound is in the process of construction.

Cape Cod Canal, a sea-level ship canal without locks, connecting Buzzard's Bay with Barnstable Bay on the Atlantic side of the southeastern extremity of Massachusetts. This canal is about 10 m. long, is 100 ft. wide on the bottom, and has a depth of 30 ft. Some 25,000,000 tons of freight per annum were previously carried around the cape, over a route 66 m. longer, and on which bad weather and severe storms were not infrequent.

Cape Colony, now Cape of Good Hope Province, a state of the South African Union. See SOUTH AFRICA, UNION OF.

Cape Fear River, a river of North Carolina, formed by the junction of the Deep and the Haw. It flows southeasterly and enters the Atlantic at Cape Fear. It is about 250 m. long and is navigable to Fayetteville, about 120 m. from its mouth.

Cape Girardeau, *Je rahr' do*, Mo., a city of Cape Girardeau Co., 50 m. above Cairo, Ill., on the Mississippi River and on the Illinois Central, the Southern Missouri & Arkansas and other railroads. It lies in a farming district, from which it derives considerable revenue, and is engaged in manufacturing. The principal industries are represented by flour

mills, breweries, cooperage works, brick-yards and cigar factories. An extensive commerce by rail and water is carried on, the chief articles of trade being flour, lumber, mineral paints, limestone and lime. The city has a fine courthouse and city hall and, among other institutions, St. Francis' Hospital, St. Vincent's Academy and College (Roman Catholic), the Southeast Missouri State Normal School and the Convent of the Sisters of Loretto. Population in 1920, 10,252.

Cape Hat'teras, a cape of North Carolina. It is a part of a long sand bank, separated from the mainland by Pamlico Sound. The region is frequented by severe storms and the cape is dangerous to navigation. It has a light-house 190 ft. high, carrying a revolving light that flashes every ten seconds. Three-quarters of a mile south is another light 35 ft. above the water.

Cape Horn, the southern point of South America. It is the most southerly point on the last island of the Fuegian Archipelago. Cape Horn is a high, steep, black rock, with pointed summits. It was discovered in 1616 by Schouten and named Cape Hoorn for his birth-place in Netherlands. The name was later corrupted to Horn.

Cape of Good Hope, a cape of southern Africa formed by the southern extremity of Table Mountain and rising 1000 ft. above the sea. Its discoverer, the Portuguese navigator Dias, called it the Cape of Tempests, but the King of Portugal, John II, changed its name to that which it now bears, because he thought that its discovery gave good hope of reaching India by sea. Vasco da Gama, in 1497, rounded the Cape and was the first European to reach India by this route.

Caper, *Ka' per*, a name given to several herbs and shrubs of the Caper Family native in the tropics. A few species are found growing wild in the United States. They are plants much like our mustards, having erect, branched stems which grow to a height of from one to four feet. The leaves are rounding and in some species are compound, that is,

composed of several little leaflets. The flowers grow in the joints of the leaf stems and are often handsome, showy flowers which have been the means of its being brought to this country to be used as an ornamental garden plant. The blossom throughout is made up in fours; four green, leaflike sepals, four petals, pink, white or purple in color, and from 8 to 32 stamens. In the capers common here the stems and foliage have a bitter, sickish taste, but in Eastern varieties they are pungent and peppery, and the unopened flower buds are pickled to be sold as spice. These form the capers of commerce, which are used in cookery for seasoning. Wild capers are found in Nebraska and Connecticut and southward from North Carolina.

Capercaillie, *Kap'er kale' yi*, or **Cock of the Woods**, a large game bird of the Grouse Family. The male has a dark green breast, the rest of the body being variegated black, white and brown. There is a bare spot of skin, just above the eye, which is scarlet. The female is mottled and barred with red, white and black. The throat and breast are reddish. There are several females to one male. The nest is built on the ground and a number of spotted eggs are laid. The cock of the woods is a favorite game bird and is assiduously hunted in northern Asia and Europe.

Capetian, *Ka pe' shan*, **Dynasty**, the royal line in France from 987 to 1328. Louis V, the last of the Carolingians, was succeeded in 987 by Hugh Capet, who was elected by the aid of the clergy. For the next 341 years all the rulers of France belonged to the Capetian family, and usually the son succeeded the father. The Capetians greatly strengthened the royal power in France by adhering to the principles of heredity and indivisibility of the lands belonging to the king. During this period France acquired the greater part of the English possessions in France, the Crusades took place and the Third Estate was admitted to the National Assembly.

Cape-to-Cairo, *Ki' ro*, **Railway**, a railway in process of construction in Africa,

which is to connect the city of Cairo at the north with Cape Town at the south. Railways from Cape Town to Kimberley and from Cairo to Alexandria were built in the middle of the 19th century, but it was the plan of Cecil Rhodes to extend these lines north and south until the extremes of the continent were connected by rail. This undertaking was preceded by an exploring trip through the country, and the placing of a telegraph line along the proposed route. The northern portion has been completed to El Obeid about 1150 miles south of Cairo, or about one-fourth of the entire distance.

From Capetown north a line has been constructed to the Congo States and a branch line to Salisbury in Rhodesia near the Portuguese possessions. It was not until 1919 when German East Africa passed under the mandate rule of Great Britain that an undisputed right of way over exclusive British possessions from "Cape-to-Cairo" could be obtained.

A trip on this famous road as far as it is completed is an interesting experience. From Cape Town to Zambesi the line passes through fertile plains, where cultivated fields stretch away to the foothills, miles away but easily seen in the clear atmosphere. The natives in the fields and on the platforms are not at all the wild Africans that one might expect to see, but are rather of the type of the careless, happy negroes of our own Southern States. North of the Zambesi the journey is more picturesque, for civilization has done less for the country. The road crosses the Zambesi River so close to the Victoria Falls that the spray may be felt by passengers. Farther north elephants have been known to dispute the right of way, and the hippopotamus, zebra, giraffe and other beasts of the jungle are frequently seen.

The completion of this road will begin a new age in Africa, just as the transcontinental lines began a new era in the United States. Equatorial Africa is a country of wonderful natural resources and exhaustless fertility of soil, needing only good government, contact with the

other world, and railroad communication to become a prosperous and enlightened section of the world.

Cape Town, the capital of the Cape Province, South Africa, situated on the northwest end of the Cape Peninsula, 30 m. n. of the Cape of Good Hope. The city, originally confined to the shores of the bay, is now beginning to climb the lower spurs of Table Mountain, which rises magnificently in the rear to the height of 3500 ft. The streets present a varied spectacle, with Malays gorgeous in their native costumes, old stucco-fronted brick houses built by the early Dutch settlers, mosques done in Eastern style, and modern houses of distinctly European architecture. Features of interest include the Houses of Parliament, the Supreme Court, the castle, the parade ground, several churches, the Jewish Synagogue, the Anglican Cathedral, the Cape University, the South African College, the botanic gardens, the clock tower and the old slave market. A breakwater over 4000 ft. in length protects the harbor, which affords shelter for a large number of vessels. Cape Town, the port of call for vessels passing around the Cape, has excellent railway connections, being the southern terminus of the proposed great transcontinental system, and trades with nearly all ports on the Indian and Atlantic oceans. Diamonds and bar gold are the principal exports. The city was founded by the Dutch in 1652 and captured by the English in 1806. Population in 1911, including the suburbs, 170,083.

Cape Verde, Vurd, Islands, a group of islands situated in the Atlantic Ocean off the coast of Africa, 320 m. west of Cape Verde. There are 14 islands and several smaller islets in the group, and their combined area is 1480 sq. m. The islands are of volcanic origin, and their surface is generally mountainous. The islands are a possession of Portugal and are used as a penal colony.

Capias, Ka' pi as, in law, the name of a writ in civil action authorizing the officer to whom it is intrusted to seize and hold in custody the person named in the

writ. The *capias* was formerly often employed in seizing persons to imprison them for debt. Since the doing away with that custom, it has been but little used.

Capillaries, Kap' il la riz, the tiny, threadlike tubes through which the blood passes from the arteries to the veins in its circulation through the body. See ARTERIES; VEINS; CIRCULATION.

Capillarity. Liquids which wet the tubes rise higher in small tubes than in tubes of greater diameter. The same forces cause a liquid to rise higher near the glass of the tube than at the center. If the liquid does not wet the tube, like mercury in glass tubes, the liquid falls in the tube instead of rising. The phenomena are due to cohesion in the liquid and adhesion of the liquid to the walls of the tube. They may be observed if fine tubes are inserted in a colored liquid; from the fact of being first observed in small hairlike tubes, the phenomena are called capillary phenomena. In those of the finer bore the liquid rises higher than in the others, the product of the diameter of the tube multiplied by the height to which the liquid rises being the same for tubes of various sizes. The principle of capillarity governs the rise of the sap in trees, the absorption of water in a blotter or in a cloth having but one corner immersed, and the rising of oil in the wick of a lamp. See SURFACE TENSION.

Cap'ital, in economics the accumulated wealth used as a means for the production of additional wealth. The capitalist abstains from immediate consumption and deprives himself of present enjoyment in order that he may have future profit. Capital is to be distinguished from money, for money is only one form, the common form, of capital. In different stages of civilization wealth has been represented by various forms of capital; such as tools, cattle and produce. Money has come to be the recognized form in our day.

Capital is divided into two classes, fixed and circulating. The difference is one of degree, depending on the form of

investment. Fixed capital consists of objects which can be used several times in the act of production without undergoing marked change. Machinery, tools and buildings are fixed capital. Circulating capital is that capital which is used in the course of trade and consumed in a single act of production. To this class belong all raw materials, and money used in the payment of wages and the purchase of goods for the purpose of immediate sale.

Among the concrete forms of productive capital, such as improvements upon land, means of transportation, raw materials, tools and machines, land is excluded, because, primarily, it is a gift of nature, and is not the product of industry directed toward the production of capital. Neither are food and clothing, except when in the hands of the manufacturer, to be considered as capital.

Capital when used for industrial purposes brings in returns in the way of profits of trade and investment, rent or interest. A saving of money incomes makes it possible to obtain interest on accumulated capital, and in this way the money becomes productive capital, though that term is generally applied to the material, concrete tools of production. The rate of production must exceed the rate of consumption if there is to be any progress in industry. This margin, together with the natural accumulation of resources, constitutes capital. See INTEREST; POLITICAL ECONOMY.

Capital Punishment, the infliction of the death penalty as a punishment for crime. The term is derived from the word *capital* in criminal law, which means "pertaining to the head." Crimes for which capital punishment may be inflicted vary in different countries and in different states in the United States. In England they are murder, treason, piracy and burning ships of war, arsenals and government storehouses. Under Federal laws in the United States, they are murder, treason, rape and arson. The Federal law applies only when the offense is against the officers or property of the

government, and must not be confused with state laws.

As society advances in civilization the tendency is to lessen the number of crimes for which capital punishment may be inflicted, and in some states it has been abolished. In most states capital punishment is by hanging, but in New York and Ohio it is by electrocution. There is a wide difference of opinion as to whether or not capital punishment lessens crime.

Cappadocia, *Kap'a do'shi a*, an important ancient province of Asia Minor. The boundaries varied at different times. Cyrus conquered the province, and it was ruled as an independent state from the time of Alexander the Great till 71 A. D. It then became a Roman province.

Cap'ricorn'us, **The Goat**, the tenth sign of the zodiac and an important constellation of the Southern Hemisphere. The sun enters the sign about Dec. 21 at the winter solstice. The symbol is ♊. The constellation contains no brilliant stars.

Caprivi, *Kah pre' ve*, **Georg Leo**, **COUNT VON** (1831-1899), a German soldier and statesman, born in Berlin. He entered the army in 1849 and gained distinction by his services in the war against Denmark in 1864 and the war with Austria in 1866. In the Franco-German War he was chief of the staff of the tenth army corps and did good service at the Battle of Loire. From 1883 to 1888 he was head of the Admiralty and reorganized the navy, but he returned to the command of his old army corps in 1888, and when Bismarck fell in 1890 Caprivi became chief chancellor and minister for foreign affairs. His most important measures were the German Army Bill of 1892-3 and a commercial treaty with Russia. He resigned in 1894.

Capsicum, *Kap'si kum*. See CAYENNE, *Ka en'*, PEPPER.

Cap'stan, a vertical windlass used on ships and sometimes on docks for heaving-in cables and hawsers, whether of iron, steel or hemp. Formerly made of wood and later of iron, its spindle was at first turned by manual labor, then by

steam and, in recent years, not uncommonly by electric motors. Capstan bars, long enough to permit three or four men to push on them, are still provided for use in an emergency. The windlass, with a horizontal spindle, operated by steam or by electric motors, is now rapidly superseding the capstan, because it must generally be provided anyway for the handling of freight, and it is necessarily idle at any time when the capstan can be of service.

Captain, *Kap' tin*, the title of an officer in the army and navy. In the army the captain ranks with the lieutenant in the navy, next below major and next above first lieutenant. In the navy the captain ranks next below rear-admiral and above commander. He has command of a regular vessel and is responsible for everything connected with the ship—equipment, management, discipline, etc. A captain in the army has command of a company and is responsible for the appearance, drill and efficiency of his command. The position of captain in the navy involves the greater responsibility. See NAVY; COMMODORE; COMMANDER; ARMY.

Cap'uchins, the name applied to monks belonging to the Order of St. Francis. The name is derived from the capouch or hood, which is the badge of the order. Capuchins wear brown or gray robes, go barefooted and never shave their beards. The order has its most numerous following in Austria. There are a few convents in the United States, notably in Green Bay and Milwaukee, Wis., New York City and Leavenworth, Kan.

Capybara, *Kap'y bahr' ah*, a member of the Cavy Family and the largest known Rodent, being generally at least three feet long. It has a plump, tailless body, surmounted by a rodentlike head. The hair is black at the root and tips but yellow in the center, and the coat may have a few dingy, yellow patches upon the head and body. The capybaras are South American animals, and they travel in herds along watercourses, which they search for fish. The flesh is consequently

fishy in taste and is much prized by the Patagonians. Capybaras are tamable and in captivity become gentle and affectionate.

Caracalla, *Kar' a kal' a*, (188-217), a Roman emperor, son of Emperor Septimius Severus, born at Lyons. His real name was Bassianus, Caracalla being a nickname given him by his father. Upon the death of Septimius in 211, he reigned for a short time jointly with his brother, but finally killed him. When, in 212, he became sole emperor, he put to death 20,000 of the friends and supporters of his murdered brother. During his reign Roman citizenship was bestowed upon all free inhabitants of the empire. He is remembered favorably for the building of the colossal and elegant baths of Caracalla.

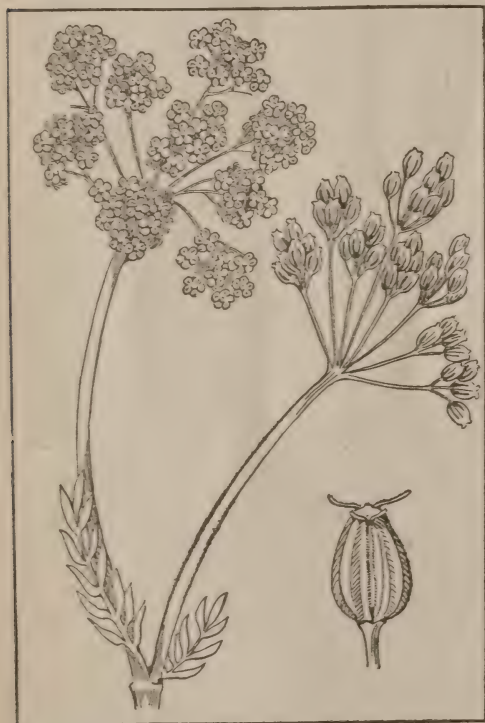
Carácas, *Kah rah' kahs*, the capital of Venezuela, situated on the western extremity of the plain of Chacao, the Guaira River flowing past the city on the south. It is connected by railway with the port La Guaira. The narrow streets are well lighted and paved; the public buildings, of which the capitol and university are the largest, are imposing; the city gardens and parks are attractive. There are no extensive manufactures, the chief export trade being in coffee, tobacco and cacao. In the central square of Carácas is a bronze equestrian statue of Simon Bolivar, the hero of South American independence, who was born and buried in the city. Carácas was the first colony in South America that revolted against and overthrew the colonial authority of Spain. The great earthquake of 1812 almost totally destroyed the city, and buried in its ruins nearly 12,000 persons. Population in 1919, estimated at 90,000.

Caracci, *Ka rah' che*, the name of three celebrated Italian painters, who flourished in the latter half of the 16th century. Ludovico, the eldest, was uncle of the two younger, Agostino and Annibale. In 1589 the three opened an academy of painting in Bologna, which quickly superseded all other local schools of art. Ludovico worked throughout his

life in his native city, where among his numerous works may be seen his celebrated Madonna standing on the moon, *John the Baptist*, *St. Jerome* and *St. Benedict*. Annibale and Agostino went to Rome in 1600 to decorate the palace of Cardinal Farnese, afterwards executing commissions in various places until they died, Agostino in 1602 and Annibale in 1609. Annibale combined with proficiency in painting great skill as an engraver. Among the notable works of Agostino are the *Communion of St. Jerome* and *Celestial, Terrestrial and Venal Love*.

Car'at. See WEIGHTS AND MEASURES.

Car'away, a cultivated European herb of the Parsley Family introduced here for its aromatic fruit, the caraway-



CARAWAY

seed. Like most members of this family, it is a tall herb with hollow stem and yellowish-green, spreading branches. The leaves are feathery because of the many fine divisions into which they are cut,

and often their bases partially encircle the stems. The flowers grow in somewhat fan-shaped clusters, generally bare of any encircling leaves. Each flower has at its base five tiny, pointed, green lobes called sepals, five white petals and five stamens. As most of the members of the Parsley Family have these same characteristics the various species are distinguished best by means of their seeds. Caraway seeds are flat, rather oblong and extremely aromatic. To some the taste is disagreeable, but many cooks make use of them as a seasoning.

Carbol'ic Acid, a heavy, oily liquid which crystallizes easily into long, fine needles, generally white but turning pink if exposed to the air. It is exceedingly poisonous, but since it is also effective in killing bacteria, it is used by surgeons as a disinfectant and antiseptic. When pure it causes painful skin wounds. If taken internally, two or three drops are sufficient to cause death. See POISON.

Car'bon, a very plentiful element found in nature in three forms, all of which are exceedingly useful. The diamond, which is the most rare and consequently the most valuable form, is a crystal having a high refractive power. It is extremely hard and differs widely in appearance from the other forms, but is known to be pure carbon because when subjected to great heat it burns to carbon dioxide (See DIAMOND). Graphite, another crystalline form of carbon, is a black, lustrous substance having a smooth, soapy surface. It was formerly called lead or plumbago, being thought to contain the metal, lead (See GRAPHITE).

Amorphous carbon, a noncrystalline carbon, is more common but less pure. It is found as charcoal, coke, soot, bone black, lampblack, coal and charred animal or vegetable matter. These forms of carbon possess the power, called adsorption, of condensing gases upon their surfaces; hence to obtain perfectly pure carbon these gases must be set free.

Carbon is one of the most important constituents of plants and animals, and exists in over 300 compounds with hydrogen. These are called hydrocarbons and

are constituents of most fats and oils. Marsh gas, which receives its name from the fact that it is often noticed bubbling up from standing water in marshes, is the simplest of these. In sugars and starches, which have the general name, carbon is a constituent. Hydrocarbons, carbohydrates and other compounds containing carbon are treated in chemistry under organic compounds, as they were once believed to be formed only by living organisms.

The alkaloids are extremely complex carbon compounds which occur in plants. Among the most familiar are morphine, nicotine, cocaine, quinine, atropine and strychnine.

The albumins, formerly called proteins, are compounds of carbon, hydrogen, nitrogen, oxygen and sulphur. They are chiefly found in the bodies of animals, in the serum of the blood, muscular tissue and milk. See CARBON DIOXIDE; CHEMISTRY, subhead *Departments*; COAL.

Car'bondale, Pa., a city of Lackawanna Co., 16 m. n.e. of Scranton and 16 m. from Honesdale, on the Lackawanna River and on the Erie, and the New York, Ontario & Western railroads. It is the center of one of the most important anthracite-mining districts in the state, having an enormous output. It contains machine shops, foundries, bottling, paint and chemical works, silk mills, etc. The city is attractively laid out and has many fine public buildings, Emergency Hospital, a park and other features of interest. Carbondale was settled in 1824 and incorporated in 1851. Population in 1920, U. S. census, 18,640.

Carbon Disul'phide, or **Carbon Bisulphide**, a highly inflammable compound of pale yellow color and disagreeable odor. It has a high refractive power and is used in dissolving resins and caoutchouc. As its name implies, it is a compound of carbon and sulphur.

Carbon Diox'ide, or **Carbon'ic Acid**, a common compound of carbon and oxygen, which is found in the air and in many varieties of spring water. Its commonness is due to the great affinity

of carbon for oxygen. It is a colorless gas and is being continually given off from the lungs of animals and wherever decay of animal and vegetable matter is going on. It is not a poisonous gas, but does not support respiration; closed rooms in which people or animals are confined become filled with the gas, and unless the air is changed, death from suffocation will ensue. The mineral springs of Saratoga, Colorado Springs and Vichy are rich in carbonic acid, and the gas also issues from the crevices of the earth in volcanic regions.

In breweries the carbon dioxide which is given off from the organic fermentation is compressed and bottled in steel cylinders to be used in making "soda water." Ordinarily hard water contains some carbon dioxide, and if the water is boiled the gas is driven off, leaving the water with a "flat" taste.

Carbon dioxide has been known as a gas since 1500, and is historically important, since it has assisted in the discovery of many other compounds.

Carbon'ic Acid. See CAR'BON DIOX'IDE.

Car'bonif'erous Period, the last of the great time divisions of the Paleozoic Age. During the time covered by this period quantities of plant remains were buried, which have since turned to coal and other carboniferous material, whence the name. The period is remarkable for the low level of continents above the sea and the consequent submergence of land and the formation of marshy or fresh water areas. During the period there were numerous upheavals of the land followed by corresponding submergence. During the time of upheaval the land was covered with a dense growth of vegetation which at the following submergence was transformed into coal. In this way the coal measures with their alternating seams of coal and layers of rock were formed. At its beginning a great inland sea occupied a basin in the central part of North America, extending from the Rocky Mountains to the Blue Ridge or Appalachian range, and a large part of Europe and of northern Africa were submerged.

The period was remarkable also for luxuriant vegetation. Ferns were the most abundant vegetable growth and presented great variety, some growing to the proportions of large trees and forming dense forests, while others were as small as the maidenhair fern of today. Of the marine animals, corals were among the most abundant; crinoids, sea urchins and fishes were very numerous. The animals included scorpions, centipedes and insects; and spiders appeared for the first time. Amphibians and other reptiles were plentiful in the seas and marshes. The term *subcarboniferous* is usually applied to that division of the Carboniferous Period marked by land submergence, during which time vegetation was scanty and marine life abundant, as evidenced by the thin, carboniferous deposits and the vast areas of limestone full of marine fossils. See COAL.

Car'borun'dum, a trade name given for an abrasive made in an electric furnace by smelting together sand, sawdust, coke and a little salt. It is used in its crushed state, like corundum and emery, and when ground into a fine powder it is employed to polish metals. It forms a valuable glaze for making fire bricks more durable, so they may stand greater heat. Its manufacture is covered by a patent and the electric smelter is at Niagara Falls. See ABRASIVES; EMERY.

Car'buncle, the name given crimson and scarlet varieties of the garnet, when so cut as to have a convex surface. The gem is found in the East Indies. When held up to the sun the carbuncle loses its deep red color and takes on the tint of a burning coal.

Carburetor, the tank of an internal-combustion engine in which the liquid fuel, such as gasoline or petroleum, is converted into combustible gas or vapor. This is done by mingling the fuel with the proper proportion of air. The valves of the gas engine are so adjusted that the production of gas is automatic and needs no attention from the one in charge of the engine. The explosion of the gas by an electric spark furnishes the power by which the engine is propelled. There

are two patterns of carburetors, known respectively as the float carburetor and the spray carburetor. In the former the gasoline is admitted to the tank, where it is mixed with air by a needle valve regulated by a float in the tank containing the gasoline; in the latter the gasoline is admitted through a nozzle in the form of a spray. See GAS ENGINE.

Car'damon, a tropical herb of the Ginger Family from which a popular spice is procured. The plant is grass-like with long, sheathing leaves and clusters of rather showy flowers. Both the leaves and flowers are aromatic, but the spice is prepared from the fruit, which is a pod from one to two inches long. These pods, which are procured from wild or cultivated plants, are borne when the plant is three years old. The seeds are small and somewhat angled. The most choice varieties have a delicate, pleasing fragrance, and the best spice is produced if the pods are picked while still green. The raising of cardamon is one of the great industries of Ceylon.

Car'dinal, in the Roman Catholic Church, the title of the highest official next to the pope. Cardinals are appointed by the pope and constitute the Sacred College. While the pope is not obliged to consult them, they, in fact, constitute his advisors. The number varies at different times. In 1912 there were 71 members of the Sacred College, classified as follows: five cardinal bishops, 62 cardinal priests and four cardinal deacons. When a vacancy occurs in the Papacy, the Sacred College fills it by choosing one of their number pope.

Cardinal, a bird of the Finch Family. The cardinal, or redbird, is an inhabitant of warm temperature portions of North and South America, extending as far north as northern Illinois and southern New York. It is a bird of low bushes, though seldom seen on the ground. The cardinal is a beautiful songster, for which reason it is frequently caged and sent to Europe under the name of "Virginia nightingale." The bright red body and black forehead and throat of the male are in strong contrast with the dull

reddish or brownish colors of the female. The cardinal is about the size of the grosbeak (eight inches) and both sexes sing, the male, however, being the more melodious. The cardinal may be known from the scarlet tanager by the absence of the black wings. The nest, which is built in a bush, resembles that of the rose-breasted grosbeak, but is more compact, and is composed of twigs, leaves, grass and fine rootlets, and lined with grass or fine roots. Two to five spotted eggs are laid, and two broods are reared in a season.

Cardinal Flower, a handsome, showy plant of the Lobelia Family found growing wild throughout Canada and the United States but frequently cultivated as a house or garden plant. There are many different species but all are herbs with tubular, irregular blossoms, whose stamens are united at the top into a curved tube which encloses the pistil. The juice is slightly milky and poisonous but in small doses is used medicinally. The leaves are generally borne from the summit of the root. Our commonest cardinal flower has a reddish-tinged stem bearing small, almost stemless, sharp-pointed leaves. The flowers are deep cardinal in color and deeply-lobed. It is found everywhere in the United States and Canada in boggy ground. The Mexican cardinal flower is a larger species growing in the South but cultivated farther north. A blue cardinal flower, also wild in the North, bears a single blue flower in the junction of each leaf with the main stem. Each of these species may bear white flowers, and all bloom throughout July and August.

Cards, Playing, pasteboard cards used in numerous games of chance. These were made known to Europeans before 1300, through Italy, Germany, France and Spain, in the order named; and seem to have had their origin among Gypsies or Saracens, though possibly even before the Christian Era they were known to the peoples of the Orient. The cards now used most commonly consist of four classes, or suits, namely: *hearts* and *diamonds*, which are red; and *spades*

and *clubs*, which are black. There are 52 cards in a *deck*, or *pack*; 13 in each suit. Of these there are three *face* cards, the *king*, *queen* and *jack*, or *knave*; while the others are designated by spots, from the *ace* (one) to the *ten spot*.

Carey, Ka'ry, William (1761-1834), a Baptist missionary and Oriental scholar, born near Northampton, England. In his early life Carey was a cobbler, and while working at his trade his Bible was always open near at hand. Becoming deeply impressed with the feeling of personal duty to make his teachings known, he began preaching at the age of 25 years. He was sent to India in 1793 as the first Baptist missionary and India was his home for the remainder of his life. He mastered the Indian language and issued from his printing house in Serampur more than 200,000 Bibles or portions of the Bible, in over 40 different Oriental languages or dialects. He was for 30 years professor of Oriental languages in Ft. William College, Calcutta, and during this time prepared a grammar and a dictionary of Sanskrit.

Car'ibbe'an Sea, a part of the Atlantic Ocean, bordered by the coasts of Central and South America and the island loop of the Greater and Lesser Antilles. The Yucatan Channel connects it with the Gulf of Mexico. Its waters are very deep, despite the fact that a solid land mass surrounds a large part of it; the depth varies from 6000 to 12,000, and even to 16,000 ft. It is about 1700 m. long from east to west. Oceanic currents influence the circulation of its waters, the equatorial current entering from the southeast. The gulfs of Honduras, Darien, Mosquito and Venezuela are its chief arms. It receives the drainage of a large portion of Central America, but less from South America, because of the rocky southern shores. The islands are few and unimportant.

Caribou, Kar' i boa, an Arctic-American member of the Deer Family, by some believed to be a variety of the European and Asiatic reindeer. The caribou is a large animal with pointed muzzle, keen eyes and branching antlers,

which are borne by both sexes and dropped in the fall. In summer its color is dark brown marked with white upon the neck and rump, but in winter it grows a thicker, paler coat. There are two varieties, known respectively as the woodland caribou and the barren-ground caribou. The former is the larger and inhabits wooded districts as far south as the southern boundary of Canada; once it was common in northern United States but the insatiable hunter has practically exterminated it, though now it is protected by law. Because of its parted, concave hoof which keeps it from sinking, the woodland caribou walks with ease over marshy ground and soft snow which other reindeer could not traverse. The barren-ground caribou travels northward in the summer but returns early in the fall in herds of thousands. Neither variety has been domesticated as has its European relative, but the caribou is probably capable of the same development. See REINDEER.

Carleton, Karl tun, Sir Guy (1724-1808), a British soldier and colonial governor. During the French and Indian wars he served at Louisburg, Quebec and Belle Isle, and in 1766 became lieutenant-governor of Quebec. A short time after taking command of the British army in Canada he repelled Montgomery and Arnold, defeated Arnold on Lake Champlain and got control of Crown Point. His generals and the King blamed him for not having captured Ticonderoga also; nevertheless, for his victories he was commissioned lieutenant-general, only to be superseded in 1777 by Burgoyne. He in turn superseded Clinton as commander-in-chief in 1782. After the treaty of peace Carleton returned to England, where he was liberally pensioned and created Baron Dorchester. For ten years after 1786 he again governed Quebec, proving a popular and efficient ruler.

Carleton, Will (1845-1912), an American poet, born in Hudson, Mich. After graduating at Hillsdale College in 1869 he lectured in the United States and began to write. Repeated visits to Europe,

especially to England, added to his popularity. For a time he was editor of *Everywhere*. He is best known for his ballads of home life, characterized by pathos and humor, among which are *Farm Ballads*, *Farm Legends*, *City Ballads*, *Young Folks' Centennial Rhymes*, *In Old School Days* and *Drifted In*. Of single poems, *Over the Hills to the Poor-House* and *Betsy and I Are Out* have remained favorites.

Carlisle, Kahr lile', John Griffin (1835-1910), an American statesman, born in Kentucky. He was admitted to the bar in 1858 and became a member of the State Legislature the next year. From 1871 to 1875 he was lieutenant-governor of Kentucky, and in 1877 he entered Congress, serving as speaker of the House from 1883 to 1889. In 1890 he became senator, but resigned in 1893 to become secretary of the treasury in President Cleveland's cabinet. He was a vigorous advocate of the gold standard. In 1897 he resumed the practice of law in New York until the time of his death.

Carlisle, Pa., county seat of Cumberland Co., 18 m. w. of Harrisburg, in the Cumberland Valley, and on the Gettysburg & Harrisburg and the Cumberland Valley railroads. It is the seat of Dickinson College founded in 1783, which has absorbed Metzer College. The United States Field Service School is also located here. Mt. Holly Springs is a popular summer resort in the near-by Blue Mountains. Carlisle has large machine shops and manufactories of shoes, carriages, axles, paper boxes, carpets and other articles. During the Whiskey Insurrection of 1794, the militia had their headquarters here. The town was also bombarded by the Confederates on July 1, 1863. Population in 1920, U. S. Census, 10,636.

Car'los, Don. See DON CARLOS.

Carlyle', Thomas (1795-1881), a Scottish essayist, historian and philosopher, born in Ecclefechan. At the age of 14 he entered the University of Edinburgh, but, aside from his taste for mathematics, he cared little for the prescribed studies, and soon abandoned his idea of

becoming a minister. Neither teaching nor law appealed to him, and in 1818 he settled down in Edinburgh to write book reviews, translations for the magazines and articles for Brewster's *Encyclopædia*. In 1826 he married Jane Baillie Welsh, a woman of great ability, wit and beauty. Extreme poverty drove them to Craigenputtock, where he wrote *Sartor Resartus*, a book which the public received with ridicule. It attracted the young Emerson, however, who sought out the unknown genius on his lonely farm, expressed his admiration and gained a loyal, lifelong friend. In 1834 the Carlyles removed to London, and in the 30 years which followed Carlyle produced the masterpieces that brought him immediate and lasting fame. He visited Germany twice, became popular as a lecturer, and in 1865 was elected lord rector of the University of Edinburgh.

In *Sartor Resartus* ("The Tailor Retailored") Carlyle is alternately the cynic scorning the follies of men, and the prophet "letting in the light." It is a tilt at the hollowness of conventional life, a satire on its insincerities, a prose epic of his own stormy sufferings. The *French Revolution*, though not satisfying the sober requirements of accuracy, is history dramatized,—a vivid portrayal of the past, his convictions coming, as he expressed it, "flamingly from the heart." Among other works are his *History of Frederick II*, a biography of marvelous power, *Life and Letters of Oliver Cromwell*, *Chartism*, *Past and Present*, *Heroes and Hero-Worship* and *Reminiscences*. Biography to Carlyle was the heart of history, and in his forceful lives of the great leaders of the past he develops his doctrine of "hero-worship,"—the belief that to the great geniuses of the world come divine revelations which direct them and teach them how to guide the masses.

Carlyle's style characterizes the man. Of his sentences, "not more than nineteenth stand straight on their legs;" the rest are bombastic, sprawling, uncouth. Such, too, was his message—a grotesque, exaggerated attack on social tendencies, a philosophy that proposed no remedy

for what he tore down. He was a pessimist grimly enduring the torments of dyspepsia and the despondency due to early failures, selfishly accepting the sacrifices of a grudging but loyal wife. And yet, Carlyle was a prophet. In the very earnestness of his denunciation lay his message. He preached the Gospel of Work, of Duty, rather than of Happiness, and in so doing became one of the world's great reformers. In religion he was unorthodox; but after he had safely passed through the moral crisis of his early manhood, when life spelled for him only doubt and despair, he was never a skeptic. Moved by a spirit of intense indignation against social hypocrisy, and an equally intense feeling for whatever is sincere and heroic, Carlyle died convinced that he was leaving a backsliding world, but earnest people now honor him as one who helped to raise the moral standard of his age.

Car'man, Albert (1833-), a Canadian divine, born in Ontario and educated at Victoria University. He served successively as head master at County Dundas Grammar School and as professor of mathematics in and principal of Belleville Seminary (Albert College), where he was the first chancellor from 1868 to 1874. From 1874 to 1883 he was bishop of the Methodist Episcopal Church, and since then has been general superintendent of the Canadian Methodist Church. Among his writings is *The Guiding Eye*.

Carman, (William) Bliss (1861-), a Canadian journalist and poet, born in Fredericton, New Brunswick. After graduating at the University of New Brunswick in 1881, and studying at the University of Edinburgh and at Harvard, he practiced engineering and taught school for a short time. In 1890 he began his career as a journalist, as literary editor of the *New York Independent*. His writings bear directly on Canadian life and are rich in local color. He has been called "the Swinburne of Canadian poetry." In collaboration with Richard Hovey he issued volumes of *Vagabondia*, which merited the recognition they re-

ceived. Among other works are *Low Tide on Grand Pré*, *Ballads of Lost Haven*, *By the Aurelian Wall*, *Kinship of Nature*, *Pipes of Pan*, *Friendship of Art*, *From the Book of Valentines* and *The Making of Personality*.

Carmine, *Kahr' min*, a red coloring matter prepared from cochineal. Carmine is used in making red ink, in water colors and for coloring silk and other delicate fabrics. See COCHINEAL.

Carna'tion, a cultivated plant of the Pink Family, brought over from Europe and common in greenhouses. Over 400 species are known, and new varieties are constantly being developed. The stems are leafy and slender, the leaves grass-like and the flowers generally solitary and nodding. It is a popular flower because of its long life, its fragrance and its continued blossoming. It is a cultivated cousin of the clove pink, and is the state flower of Ohio.

Carnegie, Andrew, philanthropist; born at Dunfermline, Fifeshire, Scotland, November 25th, 1835; came with his family to United States, 1848, settling in Pittsburgh. Died Aug. 11, 1919.

First work was as weaver's assistant; became telegraph operator, advancing until he became superintendent, Pittsburgh Div., Penna. system; joined Mr. Woodruff, inventor of the sleeping car in organizing Woodruff Sleeping Car Co.

During the Civil War he served as superintendent, Military Railways, and Government telegraph lines in the East. After war, developed iron works of various kinds. Introduced into this country Bessemer process of making steel in 1868; interests were consolidated, 1889, in the Carnegie Steel Company, which in 1901 was merged in the United States Steel Corp., when he retired from business.

Among his benefactions are \$125,000,000 to Carnegie Corporation of New York; \$10,000,000 to Carnegie Endowment for International Peace; \$16,150,000 to Carnegie Foundation for Advancement of Teaching in the United States, Canada and Newfoundland; \$24,-

000,000 to Carnegie Institute of Pittsburgh; \$5,100,000 to New York City for establishment of branch libraries; \$22,000,000 to Carnegie Institution of Washington; \$10,000,000 to Scotch Universities; \$5,000,000 to fund for benefit of employes of Carnegie Steel Co.; \$1,000,000 to St. Louis Public Library; almost \$12,000,000 to Hero Funds of various countries; \$3,500,000 to the Carnegie Dunfermline Trust; \$1,500,000 for the Peace Temple at The Hague; \$1,500,000 to Allied Engineers' Societies.

Total benefactions exceed \$300,000,000, including over \$60,000,000 for over 3,000 municipal library buildings.

Author: *An American Four-in-Hand in Britain*, 1883; *Round the World*, 1884; *Triumphant Democracy*, 1886; *The Gospel of Wealth*, 1900; *The Empire of Business*, 1902; *The Life of James Watt*, 1906; *Problems of Today*, 1909.

Carnegie, Pa., a city of Allegheny Co., 8 m. s.w. of Pittsburgh, in the Chartiers Valley, on the Pittsburgh, Cincinnati, Chicago & St. Louis and the Pittsburgh, Chartiers & Youghiogeny railroads. The borough or town was formed in 1894 by the consolidation of Chartiers and Mansfield. The Carnegie Free Library, Masonic Temple and St. Paul's Orphan Asylum are noteworthy features. The city is chiefly noted for its steel-manufacturing interests. There are also manufactories of stoves, lead, glass, tinware and other articles. Coal is largely mined and shipped here. Population in 1920, U. S. Census, 11,516.

Carnegie Foundation for the Advancement of Teaching. An institution founded by Andrew Carnegie in 1905, and incorporated by the Congress of the United States in 1906. The institution is endowed with \$15,000,000 to provide retiring allowances for teachers and officers of colleges, universities, and technical schools in the United States, Canada, and Newfoundland, and with \$1,250,000 to provide for educational inquiry and publication. By the thirteenth annual meeting of the trustees in 1918 the Foundation had granted 469 retir-

ing allowances and 151 widows' pensions in the associated institutions at a cost of \$4,910,967.17 and 135 allowances and 43 widows' pensions in 87 other institutions at a cost of \$1,349,532.99. The total expenditure for the entire 798 allowances and pensions amounted at the date mentioned to \$6,260,500.16.

In the administration of its endowment, the foundation has restricted its allowances largely to professors and officers in a list of seventy-six institutions selected for their educational standing, and has published a series of influential reports and bulletins concerning educational conditions. Address, 576 Fifth Avenue, New York City.

Carnegie Institution of Washington, an institution founded at Washington, D. C., in 1902, by Andrew Carnegie, for the promotion of research. The Articles of Incorporation of the Institution declare in general "that the objects of the corporation shall be to encourage in the broadest and most liberal manner investigation, research and discovery, and the application of knowledge to the improvement of mankind." To forward these objects there have been developed (1) the formation of departments of research within the Institution itself, to attack larger problems requiring the collaboration of several investigators, special equipment, and continuous effort; (2) provision whereby individuals may undertake and carry to completion investigations not less important but requiring less collaboration and less special equipment; (3) provision for adequate publication of the results of research carried on by the Institution and to a limited extent also of worthy works not likely to be published under other auspices.

Carniv'ora, one of the great groups of Mammals, characterized by requiring for their food the flesh of other animals which they kill as needed. This preying upon living animals has developed in all members of this group, a remarkable armor both for offense and defense, and has made them a race of hunters and fighters. Many have sharp claws, heavy

hair, powerful jaws, and strong, agile limbs. With the exception of the bears, all walk upon the under surface of the toes and have teeth particularly fitted for tearing, cutting and grinding animal food. Their long, strong canine teeth combine both hook and dagger, and assist in holding as well as in seizing their prey.

Carnivorous animals are of economic importance as "nature's police," keeping down the numbers of rapidly reproducing Rodents and insects, which otherwise would overrun many parts of the world. They are wise animals as well, for they get without effort the vegetable food which the lesser, herbivorous animals have collected and assimilated. It is said that the lion in eating an antelope devours in five minutes the vegetable food which the antelope has taken a day to collect. In general, the Carnivora are considered a higher class than the Herbivora. The chief families of Carnivora are: of land animals, cats, civets, hyenas, weasels, dogs, bears and raccoons; of sea animals, seals and walruses. Carnivora are found in all parts of the globe; they appeared during the Tertiary geologic period after the disappearance of the huge reptiles, which had previously overrun the earth. See ZOOLOGY, subhead *Classification*.

Carniv'orous Plants. See SUNDEWS; VENUS'S FLYTRAP; PITCHER PLANT.

Carnot, *Kahr no'*, **Marie François Sadi** (1837-1894), a French statesman and president of the French Republic from 1887 to 1894, born at Limoges, France. He studied for the work of an engineer, showing decided ability in the profession. In 1871, during the siege of Paris, he became prefect of the Lower Seine. He was later a member of the National Assembly, and in 1886, an officer in the Brisson cabinet. In 1887 Grévy resigned the presidency of France, and Carnot was elected to fill that position. He was assassinated during a celebration in his honor at Lyons.

Carolina Paroquet, *Par' o ket*, a parrot found in the southern part of the United States. It is about 13 inches long

and brilliantly colored. The head and neck are yellow, except the forehead and cheeks, which are orange-red. The body and tail are green above and the lower parts are tinged with yellow. The wings are green and yellow bordered with orange. These birds are found in the



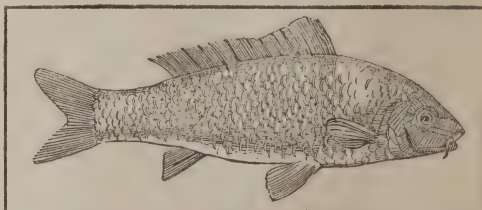
CAROLINA PAROQUET

densest woods and cypress swamps of the Southern States and they sometimes venture as far north as the Illinois River. They live in flocks and usually nest in colonies. The nest is placed in the fork of a tree or on a branch and is made of loosely-woven twigs. From three to five creamy-white eggs are laid. The food consists of seeds and berries.

Carolingians, Kar'o lin' ji ans, or Carolingians, the second dynasty of Frankish kings. Having supplanted the Merovingians, they took their name from Charles Martel, who was mayor of the palace and the real ruler under the Merovingian kings. Martel subjected three states to his power. Following his death, in 741, the Merovingian dynasty nominally remained in power; but in 751, his son, Pippin the Short, was crowned King of the Franks, thus formally com-

mencing the Carolingian dynasty. Pippin began the conquest of Italy and was succeeded by his sons, Carloman and Charlemagne. After 771 the latter reigned alone and greatly extended his kingdom, in 800 being crowned Emperor of the Western Roman Empire. Charlemagne was succeeded by his son, Louis the Pious, who, in the list of French kings, appears as Louis I. Family feuds broke out during this reign, which terminated ingloriously in 840. The Empire of the West was divided among several brothers, and Charles the Bald, son of Louis the Pious by a second marriage, inherited the territory corresponding to modern France. He is generally deemed the founder of the French dynasty, which, after his death in 877, continued for about a century, through a succession of weak monarchs. It terminated with the death of Louis V in 987.

Carp, a large family of fish which includes such fresh-water fish as the true carps, goldfish, gudgeons, breams and minnows. All are distinguished by their small mouths, strong teeth and compressed bodies covered with shining scales. Representatives of this family are found throughout Europe, though it is believed they were brought there some 300 years ago from China. From Europe they have been brought to the United States, where they are successfully propagated.



CARP

The true carps are slow-moving fish, living in weedy lakes, where they feed upon Mollusks and water insects. They are exceedingly prolific and have become very common in all waters where they have been introduced. The largest carps sometimes weigh as high as 40 lb., but they are not highly prized as food fish at

present, possibly because they are caught out of muddy, nearly stagnant ponds. Some species of carp are scaleless, but the commonest, called the scale carp, has large, rounding scales. This species in Europe remains sluggish from October to March but is not known to remain so in American waters.

Carpathian, *Kar pa' thi an*, **Mountains**, a mountain system of central Europe. It describes a large arc, enclosing nearly the whole plain of Hungary and the basin of Transylvania. Of its several mountain groups, the Hohe Tatra is the loftiest, containing the Gerlsdorfer-spitze, 8737 ft. in height, the highest point in the system. Over 100 lakes exist in the interior, and, partly because of their depth, are known among the Hungarians as "Eyes of the Sea." There are no glaciers and no perpetual snow fields; the slopes are covered with valuable forests, in which prowl wolves and lynxes and bears. For centuries the metallic ores of the mountains have yielded rich supplies of silver, gold, copper and lead. There are several passes, and on one side are the drainage basins of the Dniester, Oder and Vistula, with that of the middle Danube on the other.

Car'penta'ria, **Gulf of**, a large gulf deeply indenting the northern coast of Australia. Its average length and breadth are about equal, 350 m. It contains a large number of islands, and several rivers, including the Mitchell, flow into it.

Carpenter, **Matthew Hale** (1824-1881), an American jurist and statesman, born in Vermont. He studied for two years in the military academy at West Point, but, instead of entering the army, studied law and was admitted to the bar in 1847. He practiced in Beloit, Wis., and moved to Milwaukee in 1856. Carpenter became one of the ablest constitutional lawyers of his day, and was the attorney for S. J. Tilden before the electoral commission. He was twice elected to the United States Senate, in 1869 and 1879. See TILDEN, SAMUEL JONES; ELECTORAL COMMISSION.

Car'penter Bee, a clever little bee of

the group known as solitary bees. The name refers to the habit of the female of hollowing out numerous parallel galleries in trees or logs and dividing these into cells for the lodgment of her eggs. Each cell contains a supply of honey which has been collected in the "honey crop" of the mother and cast out again into the cell, where it is mixed with pollen and furnishes the food of the hatching larva. After several days of active life the larva spins itself a cocoon and spends an equal length of time in a quiescent, pupal state. When ready to emerge as a full-grown bee, it gnaws its way to sunlight and liberty through the thin walls of its imprisoning chamber. There may be several carpenter bees working together, but they are in no sense social in their activities, and there is no division of labor. See BEE.

Carpenters' Hall, in Philadelphia the hall of an organization of the carpenters of that place, corresponding to the guild halls of London. In September, 1774, it was the meeting place of the First Continental Congress, which body accepted it in preference to the State House, which was also proffered. Later the Second Continental Congress began to hold sessions there.

Carpet, the name of a woven fabric consisting principally of wool and generally used to cover floors and staircases. The different varieties derive their names from the countries and places of their manufacture: Venetian, Dutch, Turkish, Persian, Indian, Chinese, Axminster, Brussels and Wilton. Carpets or rugs were common in ancient Babylon, Egypt and India. They were introduced during the Crusades into western Europe. The industry of carpet weaving by hand looms has always been an important one in Persia, Turkey and India. When used to cover walls or hung up as decorations, carpets are termed tapestry; silk is generally woven into them so as to form all kinds of beautiful designs, scenes and portraits in a multiplicity of colors. By perfecting the machine loom, the United States has become the greatest producer of carpets and rugs, and by

the substitution of hemp, rags and cotton, many cheap varieties are made. The moquette carpet looks like a Wilton; the ingrain carpet is an all-wool article woven with two or three webs of different colors. See TAPESTRY.

Carpetbaggers, a name given to Northern politicians who went South after the close of the Civil War for the purpose of assuming an active part in politics. They located in the Southern States only long enough to gain a residence before applying for and receiving appointments to Federal offices. The white people of the South resented this action and claimed the Northerners were trespassing on their rights, as they carried all their effects in their carpetbags and had no intention of remaining permanently in the South. The name is also applied to those adventurers who from 1865 until 1876 attempted to control the Southern States by becoming leaders of the colored voters.

Carpet Beetle, Carpet Bug or Buffalo Moth, a species of the Bacon Beetle Family. Fortunately it is not exceedingly common, for it does great damage to woolens, especially carpets, and to the fur of stuffed animals in museums. The larva is a black, hairy creature, which leaves behind it a somewhat transparent, segmented case when it changes to the pupal stage. The adult is a broadly oval beetle with short antennæ and rows of reddish scales near the center of the back. It hibernates beneath the bark of trees, but seeks entrance to houses in the spring to place the eggs in any woolen fabric. Winter garments, before being stored through the summer, should be aired, sunned and beaten, and carpets infested should be immediately taken up and beaten, or the edges painted with gasoline. Gasoline, however, must always be used with care and never in a room where there is a fire or a gas or kerosene light. The gasoline destroys the beetle and larvæ, but does not harm the eggs; hence it should be used at intervals of a week until the pest has disappeared. Balls or crystals of naphthaline laid away with woolen garments

prove effective, but they must be kept from heat. See INSECTICIDE.

Carranza, Venustiano, *Ve nus ti ahn' no Kar rahn' zah*. See MEXICO, sub-head *History*.

Carrara, Kah rah' rah, a city of Italy, about 60 m. s.w. of Modena. It is near the marble quarries, from which for centuries the famous Carrara marble has been taken. It is the purest white marble in the world and is used for statuary. The city's importance rests almost entirely on the marble quarries. Population, about 43,000. See MARBLE.

Car'el, Alexis (1873-), a distinguished surgeon, born in France and educated at the University of Lyon. In 1905 he removed to America, in 1909 becoming associate member of the Rockefeller Institute for Medical Research, in New York City. Here he gained favorable notice by his remarkable experiments in surgical grafting and in maintaining certain parts and organs after they had been taken from the body to which they belonged. He has shown, for example, that a portion of artery may be preserved in cold storage for several days or weeks and still live; moreover, that blood vessels of dogs can be transplanted from cold storage into bodies of cats. In 1912 he received the Nobel prize in medicine. In 1914 he engaged in War Hospital Work in France, where in collaboration with H. D. Dakin he developed a wonderfully successful method of treating deep wounds by continuous irrigation with a solution of bleaching powder neutralized with soda mixed with boracic acid.

Carrier Pigeon, a variety of the domestic pigeon, distinguished by a fleshy tubercle at the base of the bill and around each eye. This pigeon receives its name from its homing instinct, which causes it to return to its native home. By careful training, these birds have been made to carry messages for 500 to 1,000 miles.

Car'roll, Charles (1737-1832), an American statesman born at Annapolis, Md. He is known as Charles Carroll of Carrollton to distinguish him from his father, Charles Carroll of Annapolis.

His family came to Maryland in 1688 on account of the persecutions of the Catholics in England. He was educated in the Jesuit school at Bohemia, on Harmon's Manor in Maryland, and later at the Jesuit colleges of Saint-Omer, Rheims and Louis le Grand. Carroll was a vigorous defender of the position taken by the colonies in their difficulties with the Mother Country, writing many articles and taking part in public debates. He was elected as a delegate for Maryland to the Continental Congress in 1776, and signed the Declaration of Independence. Of all the signers he risked most, his estate being valued at the time at \$2,000,000. He also served on the war board. When the Federal Government was established, Carroll became a leader in the Federalist Party, favoring Hamilton's plans. He left active public life on the election of Jefferson in 1800. His last public act was to start the building of the Baltimore & Ohio Railroad July 4, 1828. He is popularly known as the "last of the signers."

Carroll, John (1735-1815), an American Catholic archbishop, cousin of Charles Carroll. He was the first bishop in the United States, with his see in Baltimore, and he established the cathedral there. In 1808 he was made archbishop, with jurisdiction over four sees. He was an enthusiastic patriot, and delivered a panegyric on Washington, Feb. 22, 1800, at the request of Congress.

Carroll, Lewis. See DODGSON, CHARLES LUTWIDGE.

Car'rot, a biennial plant of the Parsley Family whose fleshy root is used as a food. In its wild state it is a branching-stemmed plant with a tough root and feathery foliage. Under cultivation the root is of a yellowish-red color and the stem shorter. Carrots are planted from seed and need only slight attention; to produce the best roots they should be thinned sufficiently to allow free development. Fed to cows, carrots tend to produce an excellent quality of milk for butter making. For the table, car'rots are used in soups or cooked in cream.

Oil of carrot is valuable in tanning leather.

Car'son, Christopher (1809-1868), an American frontiersman, known as "Kit Carson." Born in Kentucky, he was a saddler's apprentice in Missouri and in 1826 he accompanied a hunting party to New Mexico. Subsequently he made several trips to the Pacific coast, went across the Rockies with Fremont, became United States agent to the Utah and Apache Indians, 1854, and, during the Civil War, was a Union scout in the Southwest, being brevetted brigadier-general after the war. In resourcefulness and daring, Carson was a match for the most crafty Indians.

Car'teret, Sir George (-1680), an English Loyalist. In the war between Charles I and Parliament, he served the King in the navy, and, when Parliament triumphed, joined the navy of France. Charles II gave his brother, the Duke of York, the Dutch Colony of New Netherland. The Duke, later James II, gave to Carteret, with Lord Berkeley, that portion now known as the State of New Jersey, June 24, 1664. This was so named from Carteret's defense of the Island of Jersey against the Puritans. Later, in 1674, when the grant was divided, Carteret's share was East Jersey.

Carthage, Kar' thaje, a famous city of antiquity, situated on the north coast of Africa, near the modern Tunis, on a peninsula extending into a small bay of the Mediterranean. Dido, Queen of the Carthaginians, is its legendary founder. Historians suppose it to have been originally a trading post established about 850 B. C., by merchants of Utica and Tyre. Our knowledge of its early history is meager, but by 149 B. C. it had become one of the greatest commercial cities of the world, having a population of about 700,000, partly of Phœnician, partly of Libyan descent. Previous to this the Carthaginians had acquired dominion over the other Phœnician colonies in northern Africa, had reduced the coast of Sardinia and founded colonies on the west coast of Africa beyond the Straits of Gibraltar. They even penetrated to

Spain and Gaul. In the fifth century B. C. they wrested Sicily from the Greeks. The rise of Rome naturally brought the two nations into conflict, and in the wars which resulted (See PUNIC WARS), Carthage was utterly subjugated. The city was captured and burned in 146 B. C. after a desperate siege. The country became a Roman province, and in 29 B. C. Augustus rebuilt the city, which afterwards became one of the finest in the Roman Empire. In 439 Genseric made it the Vandal capital. About 200 years later it was destroyed by the Arabs; at the present time two or three small hamlets and a few ruins mark the site of the once proud city.

Carthage, Mo., a city and the county seat of Jasper Co., 150 m. s. of Kansas City, on the Spring River and on the Missouri Pacific, the St. Louis & San Francisco, the St. Louis, Iron Mountain & Southern and other railroads. Carthage is surrounded by a fertile farming district, in which considerable attention is given to fruit growing; and in the vicinity are valuable deposits of marble and building stone and productive zinc and lead mines. Among the industrial establishments are flour mills, machine shops, foundries, canning factories, lime works, quarries, shoe factories, zinc works and manufactories of stoves, furniture, bed springs, mattresses, woolen goods, plows, ice and mining and quarrying machinery. Carthage has a number of handsome buildings, including a county courthouse and public library; and has a High School Building with modern equipment and courses of study, several modern grade school buildings, numerous churches, a Y. M. C. A. and other public buildings. Settled in 1833, Carthage became the county seat in 1842. The town was destroyed in the Civil War; in the vicinity occurred the battle to which it gave its name. It was rebuilt in 1866, incorporated in 1868 and five years later received its city charter. Population in 1920, 10,068.

Carthusians, *Kar thu' zhans*, a monastic order founded by St. Bruno in the 11th century. It takes its name from the

Desert of Chartreuse in the Alps, where the first convent of the order was built. At first the members lived as hermits and subsisted upon vegetables and coarse bread. After 1170 their numbers increased quite rapidly. The order was introduced into England in 1180, where the name Chartreuse Houses was eventually changed to Charter Houses.

Cartier, Sir George Etienne (1814-1873), a Canadian prime minister, born at St. Antoine, Quebec. He was admitted to the bar in 1835 and entered Parliament as a Conservative member in 1848. He became attorney-general for Lower Canada in 1856, and two years later he formed the Cartier-MacDonald ministry. He was again attorney-general in 1864, after the fall of his party. A good orator and a brave and honest leader, he did much to hasten the formation of the Dominion of Canada.

Cartier, Kahr'tya', Jacques (1494-1557), a French navigator, born at Saint-Malo. Commissioned by Francis I of France, he sailed on Apr. 20, 1534, from the port of Saint-Malo in command of two ships, each having a crew of 120 men, and in 20 days he reached Newfoundland. Sailing northward through the Strait of Belle Isle, he reached Labrador, which he claimed for France. He then turned southward to Cape Race, explored the Bay of Chaleurs and Gaspé Bay, crossed the Gulf of St. Lawrence and, out by way of the St. Lawrence River, returned to France. With a later squadron, bearing some of the young nobility of France, Cartier reached Quebec on Sept. 14, 1535, and, sailing up the St. Lawrence, arrived at the Huron village called Hochelaga, on the present site of Montreal, for which name also he is responsible. Having gone back and spent a severe winter in Quebec, where 25 of the crew died of scurvy, the Frenchmen returned to Saint-Malo in July. With them were nine Indian chiefs, with whom they had treacherously sailed away, and all of whom died in France of grief. A few years later, Cartier was made captain-general and chief pilot of the royal ships, and in

August, 1541, again reached Quebec. The Hurons soon showed themselves hostile, because of the past treacheries of Cartier, and as a result he was obliged to build a fort for protection near Quebec. Throughout the winter he there awaited the viceroy, who had not sailed from France with him, but finally, in May, grew discouraged and departed for home. In the harbor of St. Johns he met De la Roche, with whom he refused to sail back to the St. Lawrence, and arrived in France in the summer of 1542.

Car'tilage, a firm and flexible tissue occurring in vertebrate animals, which serves to support certain parts of the body. It is strong and elastic, and pearly white in appearance, and is found in those parts of the body where toughness and elasticity are required. In the early stages of individual growth, a large part of the supporting framework of the body consists of cartilage, which afterwards is changed to bone. In some parts of the body the masses of cartilage do not change to bone, but retain their cartilaginous structure. The former is called temporary cartilage, the latter, permanent cartilage. The permanent cartilage is an important part of the body structure, occurring in those places where toughness and elasticity are required. It is found in the nose, joints and external ear, and the rings around the windpipe.

Car'tridge, a complete round of ammunition for a gun, loaded in a paper or brass shell. The first cartridges were made for muzzle-loading guns in paper packages. The modern ball cartridge is composed of a brass shell loaded with a primer of mercury fulminate, a charge of powder and an oblong, lubricated ball made of lead hardened with tin and having a jacket of still harder metal. The blank cartridge has a bullet of paper instead of lead. A multi-ball cartridge contains two or more small balls instead of one and is used only at short range. Cartridges for shotguns are made in a paper shell with brass base, shot being used instead of a ball. All modern cartridges are center-fire, having the primer in the center of the base. Other car-

tridges are the rim-fire, in which the hammer strikes the rim of the cartridge, and the pin-fire, in which the hammer strikes a pin which is so driven against the primer as to explode the cartridge.

Cartwright, Edmund (1743-1823), inventor of the power loom, born in England. He was educated at Oxford, and until he was 40 years of age devoted himself to the ministry. In 1784 a conversation with some men from Manchester on the subject of mechanical weaving suggested ideas that resulted in his invention in 1785 of a power loom. Within a few months his loom was running. But the innovation was thought by both manufacturers and workmen to be detrimental to their business and was opposed, the first factory using the loom being burned. The invention, was, however, too valuable to be lost, and finally made its way, becoming the basis of the power loom of today. Other inventions made by Cartwright were not so successful. The power loom brought him an appropriation from Parliament of \$50,000.

Cartwright, Sir Richard John (1835-1912), a Canadian statesman, born at Kingston, Ontario. He was a Conservative member of the Canadian Parliament in 1863, served as minister of France from 1873 to 1878, and became a leader of the Liberal Party from that time. In 1896 he entered Sir Wilfrid Laurier's cabinet as Minister of Trade and Commerce, and was sent to Washington the next year to promote better relations between the United States and Canada. He proposed the Anglo-American Joint High Commission and represented Canada when the commission met at Quebec and Washington in 1898. He was acting Premier in 1897, and again in 1907.

His *Reminiscences*, published in 1912, present a valuable study of events and public men with whom he came in personal contact down to the year 1896.

Caruso, Kah roo' zo, Enrico (1874-1921), the celebrated Italian tenor, born in Naples, the son of a peasant family. After some study he made his professional debut at Milan in 1898; and since that time he had great popularity, singing in all the large music centers of

the world. His voice was pronounced the most beautiful tenor that has been heard by the present generation. It was rich, mellow and sonorous, of perfectly equalized scale and exceptional natural purity.

Carver, John (1575-1621), first governor of Plymouth Colony, was an Englishman who went to Leyden, then the retreat for Separatists. He sailed with the Pilgrims in the *Mayflower* (1620). Because of his firmness and sagacity, Deacon Carver was chosen governor of the colony before the boat landed. He died during his first spring in America.

Ca'ry, Alice (1820-1871), and **Phœbe** (1824-1871), two American poets, sisters, born near Cincinnati, Ohio. They began to write at an early age and removed to New York in 1850, where they carried on their literary work in unbroken companionship during the rest of their lives. Their Sunday evening receptions to authors and friends became very popular. Cheerfulness, noble sentiment and melody are characteristics of their poetry. Phœbe Cary is best known for the hymn *Nearer Home*, or *One Sweetly Solemn Thought*. Her sister, Alice, was the more productive of the two, both in poetry and prose, her novels and essays, however, being of minor importance. Among her works are *Lyrics and Other Hymns*, *Hagar: A Story of To-day*, *The Bishop's Son* and *Snow Berries*, a book for young people.

Cascade' Range, a range of mountains of western United States forming an almost continuous line with the Sierra Nevadas and extending north from them through Oregon and Washington. They are almost parallel with the coast and in Oregon lie about 100 m. inland, and in Washington about 150 m. Upon their eastern faces they descend into a comparatively dry region, but on the west the rainfall is abundant and the slopes are heavily forested. The Columbia River breaks through the Cascade Range, and its beautiful cataracts and falls gave the name to the mountains. The loftiest summits of the range are in Washington; Mt. Rainier, or Tacoma (14,526

ft.), and Mt. Adams (12,470 ft.) are the highest. In Oregon the highest is Mt. Hood (11,225 ft.). Two transcontinental railways cross the Cascade Mountains, and Crater Lake, a beautiful body of water lying at an elevation of 6240 ft., occupies the hollow of a sunken volcanic cone in Oregon.

Cashew, *Ka shoo'*, a West Indian nut-bearing tree of the Cashew Family. It is slender, having many branches and many oval, almost stemless leaves. The flowers are insignificant, but grow in a much-branched leafless cluster which renders them collectively very noticeable. The fruit is a small, beanlike nut, which is borne upon a large disk called the receptacle. Both the nut and the receptacle are edible; the former is of light gray color and has a pleasant acid taste. It is prepared for use by cooking. The receptacle is juicier and sweeter and eaten without cooking. The tree is related to the American poison sumac.

Cash'mere Goat, a domesticated goat of the Himalayas and, like all goats, a member of the Bovine Family. Its chief difference from other goats lies in the fact that underneath its coarse hair is a soft wool, which may be removed by combing and from which the soft cashmere shawls are made. The colder the region in which this goat is pastured, the softer and thicker the wool. The flesh of the cashmere goat is of pleasant flavor and the milk is also good. See GOAT.

Cash Register, a machine consisting of an arrangement of keys, levers and cogwheels in a box provided with a cash drawer, for receiving cash and recording sales. It is used principally in retail stores. It is arranged with a keyboard similar to that of a typewriter; each key represents a definite amount, usually from five cents to one dollar in multiples of five cents. When a key is depressed, the amount is shown on a tablet raised within view, indicating the amount of the purchase, while the drawer opens at the same time to receive the cash from the customer. The total amount of the day's sale is obtained by adding the totals of each key's record,

or it is automatically shown in dollars and cents in an adder, which is now attached to the latest improved machines. The larger machines are now provided with a device for printing the amount of the purchase on a slip of paper drawn from a roll, and delivering it in the form of a ticket. Cash registers are now very generally used, and are found to be valuable aids to systematic cash keeping, since they prevent errors. See CALCULATING MACHINES.

Casimir-Périer, *Ka"ze"mere'-Pa'rya'*, **Jean Paul Pierre** (1847-1907), a president of the French Republic, born in Paris. He was made a member of the Legion of Honor for his distinguished conduct in the Franco-German War; held an office in the department of the interior; was elected to the Chamber of Deputies in 1874; served as undersecretary of public instruction and of war; was made vice-president of the Chamber of Deputies in 1890; and three years later became president of the Chamber, resigning to become president of the council and prime minister under President Carnot. In 1894 Carnot was assassinated and Casimir-Périer was elected on the first ballot to succeed him in the presidency of the French Republic. He resigned after holding the office a little more than six months.

Cas'pian Sea, a salt lake or inland sea forming a part of the boundary between Europe and Asia. It is surrounded by Russian territory on three sides, with Persia on the south. Its length is 700 m., its width, from 100 to 300 m., its estimated area, 170,000 sq. m. The depth varies from 75 ft. in the northern part to 2000 and even 3000 ft. in the south. Where the water is deepest it is salt, but to the north it is fresh and freezes over during the winter months. The salmon and sturgeon fisheries are extensive, and seals and herring are also found. For shipping purposes the Caspian Sea route is very significant, especially to Russia. The waters of the Volga, Ural, Kur and Emba rivers fall into it. On the Russian shore are Astrakhan, Baku, Petrovsk and Krasno-

vodsk; on the Persian, Aliabad, Enzeli and Khorrema.

Cass, Lewis (1782-1866); an American statesman, born in Exeter, N. H. He was admitted to the bar in 1803 and began the practice of law in Zanesville, Ohio, where he soon became prominent in Ohio politics. He joined the army at the beginning of the War of 1812 and rose to the rank of brigadier-general. In 1813 he was left in command of Michigan, with headquarters at Detroit, and was almost immediately thereafter appointed civil governor of the territory then extending to the headwaters of the Mississippi. This office he retained for 18 years, and throughout the vast wilderness under his jurisdiction he instituted surveys, constructed roads, built lighthouses along the lake shore, organized counties and townships; in a word, laid the foundations of civilization. In 1831 Cass became secretary of war under President Jackson; subsequently he was minister-plenipotentiary to France, a member of the United States Senate and secretary of war under President Buchanan. He was nominated for the presidency by the Democratic Party, but was defeated by General Taylor. Continuing in the Senate, he advocated measures designed to preserve the Union. General Cass was a man of great natural abilities and a scholar of fine attainments.

Cassan'dra, daughter of fabulous Priam and Hecuba, to whom Apollo gave the gift of prophecy in return for her love. When she faithlessly repulsed him, he vowed that none should give credence to her warnings; thus her predictions concerning the downfall of the Trojans were derided. When Troy fell, she became the captive of Agamemnon. Vainly she admonished him against returning home to Mycenæ, where they were both murdered.

Cassatt', Alexander Johnston (1839-1906), an American capitalist and railway promoter, born in Pittsburgh, Pa. He was educated at the University of Heidelberg and at the Rensselaer Polytechnic Institute, Troy, N. Y. His earlier work in practical railroading was

done in Georgia. Entering the service of the Pennsylvania Railroad Company as rodman in 1861, he became superintendent of motive power and machinery in 1867, and was steadily promoted until, in 1899, he became president of the system. Through his efforts the Pennsylvania lines were consolidated and the freight and passenger traffic extended. He was one of the most efficient and influential railroad men of his times.

Cassava, *Kas sah' va*, or **Manioc**, *Man' i ok*, a branching shrub of the Spurge Family, native in tropical America but cultivated in the tropics everywhere. It grows from six to ten feet in height and bears broad leaves which are divided into long lobes that spread like palm leaves; there are from three to a dozen lobes on one leaf. The flowers grow in sprawling clusters and, as individuals, are rather insignificant. The roots, which are the valuable part of the plant, grow in long clusters from one to six feet in length and often weigh as high as 20 lb. The meal prepared from them is used in making bread, cakes, food for stock, sauce and intoxicating drinks. The method of preparation is simple and the work is carried on entirely by hand. The roots are first peeled, then grated and the juices pressed out. This last step must be carefully performed, as cassava roots contain a large per cent of prussic acid, a highly poisonous substance. To be perfectly sure that no part of the poison remains, the mass is heated and the acid, which is extremely volatile, is entirely removed. The resulting cake is then ground and the meal stored for later use. The starch removed from the fibers of the plant is the Brazilian arrowroot of commerce, and the same starch heated to an intense heat solidifies in little kernels known as tapioca.

There are many varieties of cassava, all grouped under the two heads, sweet and bitter cassava. Both are valuable, but the sweet cassava is used with less preparation. Brazil, Guiana, the East and West Indies, and Florida are the

greatest producers of cassava. See **TAPIoca**.

Cassia, *Kash' a*, a shrub or tree of the Pulse Family from which the drug, senna, is procured. It is a tropical shrub and has very few representatives in the United States. These, too, were probably introduced into old-fashioned gardens whence they have run wild, and when met in fields or by roadsides are generally called wild senna. The tropical cassia is a small shrub with smooth stems and pleasing form. The leaves are composed of five pairs of pointed leaflets slightly bent at the midrib. The flowers are in small but tightly-packed clusters, in which the lower open first. The individual blossoms are yellow, with spreading, roselike petals and many stamens, which, as they wither, are succeeded by slender, curving pods.

Cassia grows abundantly in southern China, where its bark is made use of as an adulterant for coffee and cinnamon. The seeds of one variety are used as an irritant in the treatment of eye diseases. From the leaves of the species grown in Arabia, India and Egypt true senna is produced and prepared in large quantities for export. Wild cassia, or wild senna, of the United States is an herb growing in rich soils, mostly in the South. Except for the fact that it is an herb rather than a shrub, this species closely resembles the tropical senna.

Cas'sidy, John Joseph (1843-), a Canadian physician, born in Toronto. He was educated at St. Michael's College, Toronto, and at the College of Sainte Anne de la Pocatiere, P. Q. He was surgeon at the House of Providence and the General Hospital, Toronto, and examiner in medicine and therapeutics at Toronto University from 1886 to 1888. Since 1882 he has been on the provincial board of health. For some years Dr. Cassidy edited the *Canadian Journal of Medicine and Surgery*, and besides various medical papers he has written a *Manual of Hygiene*.

Cassiopeia, *Kas' i o pe' ya*, (seated lady), a North Polar constellation composed of 50 stars visible to the naked

eye, seven of which usually locate it. If a line be drawn from the star at the junction of the handle and the bowl of the Big Dipper (Ursa Major) through the North Star and on an equal distance beyond, it will strike Capt in Cassiopeia. Capt with four other stars of the constellation form a wide open M (m). In certain positions the constellation resembles an inverted chair. See CONSTELLATIONS; STARS; BRAHE, TYCHO; GREAT BEAR.

Cassiopeia, wife of the Ethiopian, King Cepheus, and mother of Andromeda, who so angered the sea nymphs by boasting of her beauty above theirs, that they persuaded Neptune to ravage her country by a hideous sea monster. After death, Cassiopeia became a constellation of several stars, but the sea nymphs succeeded in having her placed near the North Pole, where, for a part of each night, she must humbly hang with head downward.

Cassiquiare, *Kahs"se ke ah'ra*, a river of Venezuela connecting the Orinoco with the Rio Negro. It flows southwesterly in a winding course for 240 m. and enters the Rio Negro above San Carlos. The water parting between the basins of the Orinoco and the Rio Negro is so low that at high water the Cassiquiare often flows in the opposite direction. The stream is navigable its entire length and forms an important connection between the Orinoco and an extensive area in the interior of South America.

Cassius Longinus, *Kash'i us Lon j'innus*, Caius, a Roman, one of the assassins of Cæsar. In the civil war between Pompey and Cæsar, he fought against Cæsar, who took him prisoner but pardoned him, made him a legate and promised him the governorship of Syria. The jealousy and hatred of Cassius for Cæsar, however, led him to instigate the conspiracy against Cæsar's life. At Cæsar's funeral (B. C. 44) it became evident that the people would not support the conspirators and he fled to Syria and established himself there. Later he and Brutus united their forces, and, meet-

ing the army of Antony and Octavius at Philippi, were defeated. Cassius escaped and at his own demand was slain by his freedman, Pindarus. See BRUTUS, MARCUS JUNIUS; CÆSAR, CAIUS JULIUS.

Cas'sowary, flightless birds related to the ostriches. There are about a dozen species which live in the forests of New Guinea and near-by islands, and single species occur in northeastern Australia. They live in the dense thickets, and, like the ostriches, are swift runners. They are flightless, the wings being represented by four to six bare quills or shafts. The claw of the middle toe is much elongated and is capable of delivering a strong blow. The feathers are more or less hairlike and hang loosely on the bird. The head and neck are naked and are colored a brilliant blue and red, or yellow and blue. The neck is ornamented by wattles and a peculiar bony protuberance surmounts the head. The nest is made in a depression in the leaves which cover the ground, and five to eight green eggs are laid. The food consists of berries and other fruit, worms, insects, etc. The best-known species is the helmeted cassowary, which lives in Ceram, and stands about 47 inches high.

Castelar, *Kahs"ta lahr'*, Emilio (1832-1899), a Spanish statesman. In 1866, while professor of history at the University of Madrid, he became involved in a republican movement and fled to France. Two years later he returned to Spain and was elected to the Cortes, or Spanish Parliament, in 1869. In 1873 he was elected president of the Cortes, but resigned the next year, and again left the country when Alfonso XII became king in 1874. He returned a little later and served in the Cortes for many years. As time passed, his convictions grew that Spain was best ruled under a monarchy. He wrote many novels, histories and political works.

Castile, *Kas tele'*, a former kingdom of Spain. It occupied the great central table-land and had an area of 27,850 sq. m., or about the area of Maine. In the 11th century Castile was created into an independent kingdom and soon united

with the Kingdom of Leon. With the marriage of Ferdinand of Aragon with Isabella of Castile in 1469, these kingdoms were united. The conquest of Granada in 1492 brought all of Spain under Christian rule. This kingdom is of peculiar interest because it was Isabella of Castile who, by her liberality, made the first voyage of Columbus possible. See COLUMBUS, CHRISTOPHER.

Castle, *Kas'el*, a structure designed for a residence and a place of defense, and used principally during the Middle Ages. The castle doubtless originated with the military structures of the Greeks and Romans. It reached its highest perfection in the Acropolis, though this was not a typical castle of later times. The Roman castle originated in the military camp and consisted at first of a structure of palisades and earthworks. In later years these gave place in some localities to structures of greater prominence. The term *castle*, however, when unqualified, brings to mind the structure of the Middle Ages. In the north of Europe and the British Isles during the ninth and tenth centuries, castles were constructed of wood and earth. Gradually stone replaced the wood and earth, and the typical castles of the time appeared. They were all built upon practically the same plan, though differing widely in size.

Whenever possible, the castle was located on a high bluff or the top of a hill or crag. When located on level lands, it was surrounded by a moat or ditch, which was crossed at the main entrance by a drawbridge that was taken up on the approach of an attacking party. The outer wall was high and supposed to be strong enough to resist any attack, and was surmounted at every angle with a tower. These towers were pierced by openings through which the defenders hurled missiles upon the attacking party. The entrance through the outer wall was narrow and was protected by strong gates and the portcullis, an extra gate which could be raised and lowered by chains. Within there were usually an inner and an outer court and a strong

building known as the keep, dongon or dungeon, within which the lord of the castle lived. His retainers occupied the courts.

Many picturesque ruins of these castles are still to be seen in Great Britain, France, Germany and other European countries, and around these castles cluster much of the history and romance of the Middle Ages. In England the royal residence at Windsor and Balmoral are designated as castles, and Stirling Castle is prominent in the writings of Sir Walter Scott.

Cas'tor and Pol'lux (*Di'oscú'ri*), twin sons of Leda and Jupiter. The former was a famous charioteer; the latter a great pugilist. They recovered their sister Helen from Theseus, attended the Calydonian Hunt, joined Hercules against the Amazons, sailed with Jason and helped storm Ioclus. Attending a wedding, one day, they became infatuated with the brides, whom they stole. In the subsequent conflict with the grooms, Castor was killed. Pollux, who was immortal, grieved so much that Jupiter granted them alternate days on Olympus and in the underworld. Temples and statues were erected to Castor and Pollux, who were usually represented as mounted on gallant steeds, spears in hand and wearing egg-shaped caps. They were supposed to watch over all who were on the waters. Their brotherly love has been perpetuated in the constellation Gemini, the Twins.

Castor Oil, a medicinal and lubricating oil derived from the castor-oil bean, a plant of the Spurge Family. The plant is tall and treelike in manner of growth. The leaves are broad and spread flat in somewhat the manner of fingers from the palm of the hand. The coarse, red stems bear two kinds of flowers and later the fruit, which is a bur that splits open when ripe, scattering the seeds. These seeds are the source of the castor oil, which is prepared by various methods, most commonly by warming the seeds, and pressing them between rollers, after which the expressed oil is collected and purified. The castor-oil bean is raised



REPRESENTATIVES OF THE CAT FAMILY

Panther
Jaguar

Lion

Leopard
Tiger

for its seeds in the United States in Missouri, Oklahoma and other South Central States. Farther north it is raised for ornament.

Castor oil is a thick, colorless oil having a disagreeable taste. It is an excellent cathartic because of its mild, healing effect, but its unpleasant taste renders it difficult to take unless disguised in fruit juices or coffee.

Castro, Cipriano (1860-), a military leader and president of Venezuela, born near the frontier of Colombia. From the first he took an active part in politics. After participating in several insurrections, in which he displayed good leadership, he became president of Venezuela by a military ruse in 1901. His administration was characterized by trouble with foreign powers and insurrections at home and he was finally compelled to leave the country. He remained in Europe until 1913, when he made a short visit to the United States.

Cat, the name applied to many animals of widely differing habits all classed in the Feline, or Cat, Family; unmodified, the term indicates the domestic animal well known since earliest times. The original of our species of cats is probably the Egyptian cat, which was revered as a goddess and yet allowed to serve as a Rodent destroyer during life, and after death was carefully embalmed and entombed in the Pyramids; our familiar term *pussy* is probably a corruption of *Pasht*, the name of the Egyptian moon goddess, who guarded the nightly prowls of her more useful earthly associate.

The cat is a graceful animal, especially when young, and is exceedingly active, with strong muscles, long limbs and sharp, sheathed claws. The ears are pointed and erect; the face, which differs somewhat in different species, is commonly marked with two darker lines from the corners of the mouth to the ears; in form it is somewhat rounding, with protruding, though not pointed, muzzle. The eyes are fitted for hunting in dark as well as in daylight and the sense of smell is very well developed.

No animal responds more readily to care; under it, its fur becomes soft and silky, its habits domestic and its actions playful or dignified. In color cats vary from white through shades of yellow, brown, gray and striped or spotted, to intense black. Cats generally make their home in or near human habitations, where they find opportunity to exercise their hunting proclivities in catching mice, crickets, birds and even such wood creatures as squirrels and gophers. For cunning and skill the cat shows as great intelligence as the dog, though less attention is given to its training.

Persian and Angora cats are prized for their long silky fur; Manx cats are tailless; the tortoise-shell is remarkable for its beautiful marking and the maltese for its soft color. Other animals belonging to the Cat Family are the puma, or panther, the lion, lynx, leopard and wildcat, each of which is described under its title.

Cat'acombs, underground burial places. There are catacombs in many ancient Eastern countries, in Paris and even in Central America, but the most famous are those of the early Christians under the Campagna near Rome. They were also used as secret places of worship by the Christians during the Roman persecutions. They are built in long galleries, one rising above the other, and branching out in all directions. The bodies were buried in the sides of these galleries up to the very arches, tier upon tier, and the symbols of the Christians' faith, the dove, a palm branch or an anchor, are carved upon the walls. About 6,000,000 Christians were buried here.

Catalina, *Kat a lene'a*, Island, or **Santa Catalina**, an island of the Santa Barbara group, lying about 20 m. s.w. of San Pedro, Cal., and belonging to Los Angeles County. It has an area of about 100 sq. m., and is rocky but wooded. Avalon, on the southeast coast, is its most noted town and is well known as a resort. Along the eastern shore of the island lie the famous Marine Gardens which, because of the clearness of the water and the rich vegetation and varied

animal life of the sea floor, are visited annually by thousands of tourists, who view these from glass-bottomed boats.

Catal'pa, a widely planted tree of the Bignonia Family, which grows wild in southwestern United States but is grown elsewhere as an ornamental tree. It grows rapidly, is graceful in outline, and by means of its many large leaves presents a close shade and is thus popular for lawns and parks. The tree is generally straight, with a slightly rough, gray- or brown-striped bark, which in the saplings is often pale green. The tree is apt to have a number of young off-shoots growing at its base, which, unless trimmed down, take away much of the life of the tree. The leaves are often a foot long and are acutely pointed, with heart-shaped bases, downy underneath and pale green. The flowers grow in loose clusters and the individual blossoms are irregularly bell-shaped in form, the tube being somewhat swollen at one side and irregularly waved at the margin. In color they are white, with brown, purple or yellow, uneven lines, and are sweetly scented. The flowers are not ornamental when removed from the tree, as the stems are somewhat awkwardly spread and rather brittle. Both flowers and leaves have the habit of falling in great numbers after they have begun withering. Sometimes in one day, after the first leaf has fallen, the entire tree will be denuded of its leaves. The fruit, which clings to the tree through the winter, is a long, pithy pod shaped like a banana, though longer and more rounding and slender; from this it receives its Western name of Indian bean.

Cat'amaran', a sort of raft used by the Ladrone and Fiji islanders, and by some natives of India and of South America. The catamaran commonly consists of three logs fastened together, the center log being longer than the others and somewhat sharpened. Some of these catamarans are more than 60 ft. long. Experts in aquatic sports have built catamarans by fastening together canoes, boats or cigar-shaped tubes; and some, capable of carrying several hundred pas-

sengers, are propelled by powerful engines.

Cat'amount. See LYNX.

Catania, *Kah tahn' yah*, a city and seaport on the east coast of Sicily, near the foot of Mt. Etna, 50 m. s.w. of Messina. It was once among the most flourishing of Greek cities in Sicily, and increased in power after it fell into the hands of the Romans. Earthquakes worked frequent ravages in the city, the most destructive being the one of 1693, when it was almost completely destroyed. The eruption of Etna in 1699 was terrific. Among the ruins which have been excavated are the old amphitheater, aqueducts, baths, a hippodrome and several temples. The manufactures include silk and other fabrics, lava and amberware. Among the principal exports are wine, fruits, grain and sulphur. Population, about 217,000.

Cat'apult, or **Catapulta**, an ancient device for hurling arrows, javelins or stones. The catapult works on the principle of the crossbow. The bow is secured in a framework, bent and held in place by strong ligaments until the missile is placed and the bow released. It was invented in Syracuse in the time of Dionysius the Elder. These weapons vary in size and power from a boy's sling shot to an instrument that will hurl a beam six feet long and weighing 60 lb. to a distance of 400 yards.

Cat'aract, a disease of the eye, in which the crystalline lens loses its transparency and power of refraction. The result is partial or complete blindness. On the approach of the disease the pupil loses its color and becomes opaque and milky white. No pain is felt, and the disease can often be cured by removing the lens by surgical operation. Aged persons are the ones commonly affected. See EYE.

Cataract, or **Waterfall**, a rush of water over a ledge or precipice. Cataracts are caused by the occurrence in the course of a stream of some very hard section of rock, which resists the erosive force of the water. Beyond this obstruction the stream wears away the softer formation until the bed gradually grows

deeper and deeper, leaving the rock as a shelf or ledge high above. Sometimes a series of these rocks occurs in the course of a river, causing a continuous chain of little falls, known as rapids, such as the rapids of the St. Lawrence River. The cataracts of the Nile are of this character, though properly the term is applied only to those falls which make a long vertical descent. The largest cataract in the world is the Victoria Falls on the Zambesi River, South Africa. These falls are nearly 400 ft. in height and about a mile in width. The Falls of Niagara are over 4000 ft. in width and make a precipitous descent of 160 ft. See VICTORIA FALLS; NIAGARA FALLS AND RIVER.

Catarrh', a diseased condition of the membranes lining certain passages in the body and causing an excessive discharge of mucus. Although catarrh is found in the windpipe, bronchial tubes, stomach, intestines and bladder, its most common occurrence is in the nasal passage and throat. This form is called postnasal catarrh. Catarrh may be brought on by exposure, impure air, constipation and other injuries which cause or aggravate colds. The disease is not dangerous and can easily be treated, but if neglected may in time permanently injure and weaken the membranes and develop into more serious trouble.

Cataw'ba River, a river of the United States. It rises in the western part of North Carolina, flows eastward, then southward to Rocky Mount, S. C., below which point it is called the Wateree. Its length is 250 m. It is known locally as the Great Catawba to distinguish it from a tributary called the Little Catawba.

Cat'bird', a bird of the Mocking Bird Family. The catbird is about the size of the robin, and is easily recognized by its slate-gray body, black head and tail, and chestnut under tail feathers. It is usually a frequenter of swamps, thickets and bushy ravines, but often resorts to gardens, orchards and shrubbery near populated areas. Like the robin, the catbird has a fondness for garden berries, but its favorite food consists of

wild berries and insects. Although usually given to catlike calls and squawks when observed, it is by no means a poor singer, rivaling even the mocking bird in the quality of its notes. The nest, which is a loose structure of sticks, is built in a bush or low tree, generally within six or eight feet of the ground. It contains three to five bluish-green eggs. The catbird ranges from Canada south to Mexico, east of the Rocky Mountains. In winter it migrates to the Southern States, Cuba and Central America.

Catechism, *Kat'e kiz'm*, a book containing a summary of principles, usually of a religious doctrine, put in the form of questions and answers. Catechisms were compiled as early as the eighth century. In later times they were used by the Waldenses, Albigenses, Bohemians and other early opponents to Catholicism. During the Reformation catechisms became valuable helps to the leaders of the movement, a large number being published by Luther, Calvin and others. The Tridentine Catechism, prepared in accordance with the decrees of the Council of Trent, has high authority in the Roman Catholic Church. The Catechism of the Church of England is published in the Book of Common Prayer, and was originally put forth in the reign of Edward VI, an addition being made during the reign of James I. Among Protestant Dissenters, the best-known catechism was that of Dr. Watts.

Cat'erpil'lar, the larva, or second stage, in the development of any insect of the order Lepidoptera, which includes the moths and butterflies. Popularly the term is also applied loosely to the larvæ of some species of fly. Caterpillars differ greatly in appearance, but, in general, are fleshy, cylindrical "worms" having from four to eight pairs of legs. The first three pairs proceed from the thorax and are the ones which finally develop into the legs of the adult. They are jointed and are terminated by a tiny claw. The remaining legs are abdominal and are fleshy and elastic. They

are shed with the last larval skin and are usually known as the prolegs.

Caterpillars usually feed upon the stems, foliage and fruit of plants and are often serious pests. When ready to undergo a metamorphosis into the third, or pupal, stage, caterpillars usually spin a cocoon of silk or of the hairs from their own bodies bound with silk. In contrast to this, however, the larvæ of butterflies surround themselves with hard or leathery cases. The life of a caterpillar, from the time of hatching until its metamorphosis to the pupa, varies with the different species from a week to two months in length. See LEPIDOPTERA; BUTTERFLY.

Cat'fish', a family of fresh and salt-water fish, found in Africa and in North and South America. There are over 100 species known in the United States, of which 70 are fresh-water fish. All have slender, rounding bodies, which are either scaleless or covered with hard, bony plates, and upon their heads are eight sensitive feelers called barbels, which seem to be able to recognize the presence of food in the mud in which they dig. In general the flesh of the catfish is not considered good as a food; it is coarse and has a muddy taste; however, some species are in demand, as, for example, the blue, or Mississippi, catfish and the Great Lakes catfish. The former is an exceedingly large fish, weighing from 80 to 100 lb. The bullheads of American lakes are members of this same family. See BULLHEAD.

Cath'arine of Ar'agon (1485-1536), Queen of England, first wife of Henry VIII. She was the daughter of Ferdinand and Isabella and was married in 1501 to the eldest son of Henry VII, and, after his death, to his younger brother, who became Henry VIII. She had considerable influence with her husband for 19 years, but he had the marriage annulled when he became infatuated with Anne Boleyn. Queen Catharine remained in England at Kimbolton Castle, where she led a life of pious devotion.

Catherine II (1729-1796), Empress of Russia. She was the daughter of the

Prince of Anhalt-Zerbst, and married Peter, nephew and heir of the Empress Elizabeth, in 1745. A few months after Peter became czar, he was deposed and killed, and Catherine was declared empress. She had her favorite made King of Poland, and profited by the partitions of that country. She gained the Crimea and the Black Sea for the Russian navy, but further progress against Turkey was checked by the united opposition of the other chief powers of Europe. She was devoted to her adopted country and did much to develop its resources. She posed as a champion of liberty and a lover of philosophy, but opposed the political movement inaugurated by the French Revolution.

Cath'erwood, Mary Hartwell (1847-1902), an American novelist, born in Luray, Ohio. She graduated at the Female College, Granville, Ohio, in 1868, and the following year, settling at Newburgh-on-the-Hudson, began to write novels. After her marriage with James S. Catherwood and their removal to Hoopeston, Ill., she devoted her attention to historical romances illustrative of life in French Canada. They include *The Romance of Dollard*, *The Story of Tonty* and *The Chase of Saint Castin*. Among her stories of life upon the Great Lakes, in Illinois and in the Middle West are *Mackinac and Lake Stories*, *Old Kaskaskia*, *The Queen of the Swamp*, and *Other Plain Americans* and *Lazarre*. From fiction she turned to history and wrote the sympathetic and appreciative narratives, *The Days of Jeanne D'Arc* and *Heroes of the Middle West*.

Cathode. See ELECTROLYSIS.

Cathode Rays, rays produced in a vacuum tube by the passage of an electric discharge of high potential. The so-called vacuum tube contains an exceedingly small amount of air which acts as the connecting link between the terminals of an induction coil or of an electric machine. A stream of nonluminous rays passes off perpendicularly from the cathode, or electrode, by which the current leaves the tube; from this they have received the name cathode rays. A

piece of platinum is sometimes placed in the tube in the path of the rays, and the energy with which they strike it is sufficient to heat it red hot. An ordinary magnet will deflect the rays from their course in the same manner that a flexible wire carrying an electric current is deflected by a magnet. Technically, cathode rays consist of a stream of very minute particles charged with negative electricity, which particles are projected from the cathode and travel with great speed, about one-tenth that of light. The sudden stopping of the cathode rays by an obstruction, such as the piece of platinum mentioned above, in their path produces a disturbance of the ether now known as X rays, or Roentgen rays. See X RAY.

Catholic University of America, a pontifical school at Washington, D. C., containing schools of sacred sciences, philosophy, law, letters and science, and controlled by trustees including clerics and laymen under direction of Cardinal Gibbons. Leo XIII encouraged the project, which was made possible by a gift of \$300,000, and the first school, that of sacred sciences, opened in 1889. The institution, which maintains a very high standard of scholarship, aims primarily to encourage advance Catholic research, though it also does undergraduate work. It has a large faculty, with a student enrollment in all departments in excess of 1000. Its library contains 150,000 volumes. It has eight buildings, and an endowment of \$2,500,000.

Catiline (108-62 B. C.), a Roman senator descended from a patrician family, and chiefly connected with the conspiracy called by his name. He supported the cause of Sulla, was made praetor and later became governor of Africa. In 66 B. C., failing to obtain the consulship, he drew about him a gang of ruined adventurers as reckless and profligate as himself, and planned to murder the consuls and senators, take the property of the rich and rule as tyrant. Cicero, who was consul at the time (63 B. C.), was informed of this conspiracy and had spies busy discovering the de-

tails of the plot. On the 8th of November, while Catiline was seated in his regular place in the Senate, Cicero attacked him in the well-known *First Oration against Catiline*. As detail after detail was laid bare, Catiline grew pale, and as the orator continued with fierce invective, Catiline tried to reply, but failed. He hastened to his army in Etruria and his fellow conspirators who remained as spies in the city were executed as traitors. In 62 B. C. Catiline was defeated and slain while fighting against Antony.

Cat'lin, George (1796-1872), an American writer, traveler and portrait painter, born in Wilkes-Barre, Pa. He practiced law in Philadelphia for two years, but interest in portrait painting caused him to forsake his chosen profession. Recognizing the Indians to be a disappearing type in American life, Catlin decided to work among them in order to observe their customs and manner of living, and spent a number of years among them. His most famous pictures were painted from life, and he became one of the best authorities on the manner and customs of the American Indian that the country has produced. His collection of pictures illustrative of Indian hunting life and amusements was widely exhibited in Europe and America and is now in the famous Catlin Gallery of the National Museum of the United States. The scenes are chiefly from the prairies and mountains, a series of studies of the wildest tribes of the two Americas. Among his writings are *Manners, Customs and Conditions of the North American Indians*, *Eight Years' Travel in Europe*, *The Breath of Life* and *Last Rambles Amongst the Indians of the Rocky Mountains and the Andes*.

Cat'nip, or **Cat'mint**, a common weed of the Mint Family, which was brought from Europe as a medicinal herb and has grown in profusion all over the United States. It is a juicy herb with square stems, covered with downy hairs. The leaves are soft and somewhat thickened, with wavy margins; in form they are elongated heart-shaped. The flowers are small and greenish-

white in color, often tinged with rose. They are crowded in close clusters at the end of the stem, and blossom in the late summer. The entire plant has a pleasing, spicy odor, and it has received its name from the fondness displayed for it by cats. The odor seems to affect them in a peculiar manner, for they roll upon it, claw it and rub against it rather than eat it. The old name for the plant is catnep. It is used medically as a cure for stomach diseases.

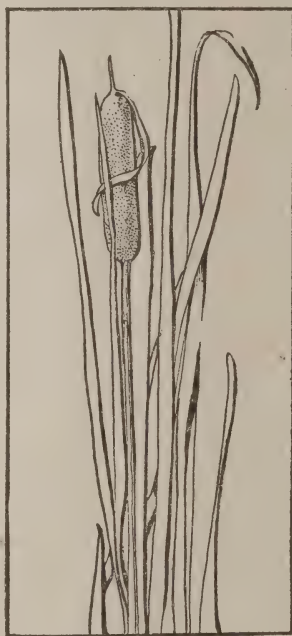
Ca'to, Marcus Porcius (234-149 B. C.), a famous Roman statesman of plebeian rank, known as Cato the Censor. He served under Fabius Maximus at the age of 17 and was at the siege of Capua. He lived on his farm for a while after the war, but soon went to Rome, where he rapidly rose in rank. In 198 B. C. he was appointed to the Province of Sardinia, he was consul in 195, and the next year obtained a triumph for his campaign in Spain. In 184 he was elected censor and fulfilled the duties of his office so severely that the title became attached to his name. He was sent as a commissioner to Carthage and was so impressed by the wealth of the city that all his speeches thereafter, in season or out, ended with the merciless declaration "Carthage must be destroyed." He was a hard husband and master, a strict manager and a type of the severe, practical, honest Roman. Cato was also one of the early Roman writers, and was the author of a history of Italy and Rome, a book on agriculture and domestic economy and numerous orations.

Cato, Marcus Porcius (95-46 B. C.), a Roman statesman, called Cato of Utica to distinguish him from his great-grandfather, Cato the Censor. By his honesty he won the respect of the people and was made tribune in 63 B. C. He was an important ally of Cicero during the conspiracy of Catiline, and opposed the ambitious plans of Pompey, Cæsar and Crassus. When war broke out between Cæsar and Pompey, Cato took the side of Pompey. He joined Metellus Scipio at Utica when he heard of the defeat at

Pharsalia. After the defeat of Scipio at Thapsus he lost all hope of holding the city and took his life with the sword.

Cat's-Eye, a variety of quartz, which takes its name from the fact that it exhibits an internal yellow radiation, which gives it the appearance of a cat's eye. When cut and polished it is used as a gem. It is found in Ceylon and Malabar.

Cats'kill Mountains, a group of mountains forming a part of the Appalachian system and occupying most of Greene County and a part of Ulster County, N. Y. They lie west of the Hudson River, from which they are eight miles distant.



CAT-TAIL

The eastern slope is very abrupt, rising almost perpendicularly in places to a height of 2500 to 3000 ft. The slopes and summits are heavily wooded; the mountains contain many deep and beautiful glens and charming cascades. From the eastern summits some of the finest views east of the Rocky Mountains are obtained.

Mountain Slide (4250 ft.) and **Hunter Mountain** (4025 ft.) are the highest peaks. The Catskills are among the most popular summer resorts in America.

Cat'-Tail'', a name given to two species of the Cat-Tail Family. The most common is the broad-leaved cat-tail, which is a perennial marsh plant with flat, stemless leaves. The flowers, which are closely crowded upon the stalk, are of two kinds, the upper being staminate, that is, containing the pollen or fertiliz-

ing dust, and the lower being pistillate, that is, containing the undeveloped seeds which are to be fertilized by the pollen. The staminate flowers are brownish-yellow, and the pistillate are a velvety red-brown. In the broad-leaved cat-tail the staminate and pistillate flowers are close together; in the narrow-leaved, a less common species, there is generally a distinct separation between the two. Both of these species flower in June and July.

Cat'tegat", or **Kattegat, The**, a sound or strait connecting the Baltic and the North seas, through the Skagerrak on the west and the Little and Great Belts and the Sound on the east. It is about 150 m. long and has a greatest width of approximately 90 m. The shores are steep and rock-bound and the high winds on its waters offer many dangers to navigation. The herring fisheries are valuable.

Cattle, a name popularly applied to all kinds of domestic animals which are of especial value to mankind, as horses, swine, cows, sheep and even chickens and bees. More narrowly the term is restricted to apply only to the commonly domesticated members of the Bovine Family, the cow, bull, steer and ox. Members of this family have long been domesticated and have been used as beasts of burden and producers of milk and flesh. The herds of cattle chiefly raised in the United States are descendants of Mexican or English breeds early imported into the country, and from these attention is given to breeding certain kinds for their flesh and others for their milk.

Those chiefly of value as beef cattle are the Durham, or Shorthorn, Hereford, Galloway, Devon and Aberdeen Angus. Of these the first mentioned is the most popular. They are red and white cattle of good form, having the quality of fattening readily. When slaughtered, there is little waste. The other breeds have various qualities which render them valuable to stock raisers. With the exception of the Durhams, none of these breeds is valued as a dairy stock. The Devons have always been the work ani-

mals, but are not frequently put to that use in the United States at the present time. The dairy cattle of the small farms in the United States are crosses of different breed; more and more attention, however, is constantly being paid to the study of the breeds to see which produce the greatest quantity and which the best quality of milk. Agricultural colleges and large stock farms are studying methods of improving the species in this respect.

On the larger dairy farms the principal breeds are the Ayrshire, Holstein, or Holstein-Friesians, Jerseys, Guernseys and Durhams. The Ayrshires are red and white in color and are noted for their continued high yield of milk, which, however, is not especially rich. The Holsteins are beautiful black and white cattle, which probably rank the highest in the quantity of milk yielded. Their record yield is from 20,000 to 30,000 lb. annually. The Jerseys and Guernseys are small cattle once united under the name Alderney. Both are noted for the rich quality of their milk and are favorites in smaller stock farms.

On January 1, 1922, the United States Department of Agriculture estimated that there were on farms of the United States 24,028,000 milch cows valued at \$50.97 each; 41,342,000 other cattle valued at \$23.75 each, a total valuation of \$2,207,433,000. Bulletins from the United States Department of Agriculture and from the various state agricultural colleges have much helpful information upon stock breeding, judging and raising. These pamphlets may be had free of charge upon application. Other standard works are: Sanders, *The Breeds of Live Stock*; Curtis, *Horses, Cattle, Sheep and Swine*; Flint, *American Farmer*. See BEEF; BUTTER; DAIRY HUSBANDRY; MILK.

Cattle Tick, a parasite of the Mite Family, belonging to the subdivision, Arachnida. In the warm parts of the United States the cattle ticks infest wild and domestic animals and even man. Their eggs are laid upon the ground, generally near heaps of decaying vegetable

matter, and are hatched into the worm-like larvæ that become parasites. The larval stage lasts about two weeks and then the mature cattle tick returns to its earth-dwelling habit, in which state it continues its existence for two or three months. Cattle ticks are the means of spreading the germs of Texas fever. See MITE; INSECTICIDE.

Catullus, Caius Valerius (about 84-about 54 B. C.), a Roman lyric poet, born at Verona, Italy. Little is known of the facts of his life, though much is revealed of his internal life through the high subjectivity of his lyrical poetry. He spent a large part of his early life at Rome, and was an intimate friend of Cæsar and Cicero. His poetry is highly passionate, often sensual in its lack of reserve, but as often touched with a weird, imaginative strain of great beauty and depth of emotion. He was a master of poetic diction and revealed marked and unusual originality. His works include the marriage ode, the *Nuptials of Peleus and Thetis*, and a weird poem entitled *Attis*, together with many minor lyrics and long, dignified poems.

Caucasus, Kaw'ka sus, a mountain range forming a part of the boundary between Europe and Asia, extending from the Caspian to the Black Sea. It is about 750 m. long and from 60 to 125 m. wide. Elbruz, the loftiest elevation, is 18,470 ft. high. Several other peaks surpass Mont Blanc in height. The glaciers are not numerous, although there are fairly extensive fields of snow and ice. Dariel Pass forms one of the best routes across the range, and to the west of it stretch the mountains in a solid and almost unbroken line. Several of the central ranges are composed of granite; the lower slopes are clothed with dark forests, chiefly evergreen.

Caucus, Kaw'kus, in the United States a meeting of the members or delegates of a political party or faction for the purpose of discussing the policy of the party concerning public questions or for nominating candidates for office or for both purposes. The name is also applied to the conference of the members

of a political party in a Legislature for the purpose of determining the course which the members shall follow. Originally, a mass meeting of the voters of a local political party met in a town or village to nominate candidates for office. The caucus gradually assumed more and more functions until it became an important factor in the political system, and in some states caucuses are regulated by law. From the caucus of the smallest political units, such as towns and precincts, delegates were formerly sent to the caucus of the next larger unit. In most states now the power of the caucus is restricted to the nomination of delegates, who are elected at the primary election, and in some states the primary has practically set aside the nominating power.

The origin of the caucus is not definitely known, but it was in operation in state politics as early as 1790 and was introduced into national politics in 1800, when the Federalist members of Congress met and nominated Adams and Pinckney for the presidency. This method of nomination continued until 1824, but with increasing opposition at each succeeding presidential election, because it did not give the people sufficient voice in the nomination of the candidates. Finally, to overcome this difficulty, state Legislatures began nominating candidates, and all the candidates in 1828 were nominated in this way. Before the succeeding election, however, national conventions had been provided for and the national caucus became a thing of the past. See NATIONAL CONVENTIONS.

Caul'iflow'er, a variety of cabbage, and, like it, belonging to the Mustard Family. The heads of cauliflower, which are familiarly used as vegetables, are the leaf-surrounded flower heads of the plant. The plant is low and grows much the same as the cabbage, but is not so hardy and hence not so easily raised. It has a pleasing, peppery flavor and is in great demand in the spring. Cauliflower is the oldest-used variety of cab-

bage and was popular with the Greeks and Romans. See CABBAGE.

Cav'alry, a body of troops that operates on horseback and forms one of the three classes of troops into which every large army is divided (See ARTILLERY; INFANTRY). The cavalry is of ancient origin, and forces of cavalry were maintained by the Greeks, Alexander the Great and the Romans. During the age of chivalry no large cavalry forces were maintained, but most combats were by mounted knights. The modern cavalry is of later origin. In the United States army the regiment is the unit for cavalry organization. The regiment is organized into three squadrons of four troops each.

The regiment is commanded by a colonel; the squadron, corresponding to the infantry battalion, by a major; and a troop, corresponding to the infantry company, by a captain. There are 15 regiments of cavalry in the United States army. The brigade consists of three regiments, commanded by a brigadier-general. The brigade is organized only in time of war. The regiment consists of 1286 men besides officers, to which, when acting alone, two battalions of horse artillery are added. Cavalrymen are armed with sabers, revolvers and carbines. A cavalry division consists of three brigades, as above, six battalions of horse artillery, one company of engineers, one corps of the signal corps, an ammunition column and two field hospitals, all commanded by a major-general. A cavalry corps consists of three divisions, as above, commanded by a lieutenant-general.

The duties of the cavalry consist chiefly in striking quick blows at the weak points on the enemy's line, in supporting the center and wings of the infantry and in foraging for supplies. See ARMY, UNITED STATES.

Cavanaugh, *Kav' a naw*, John William (1870-), an eminent divine and educator of the Roman Catholic Church, born in Leetonia, Ohio, and educated at the University of Notre Dame, where he studied theology. He

was ordained priest in 1893, and was associate editor of the *Ave Maria Magazine*, 1894 to 1905. In 1898 he was chosen superior of Holy Cross Seminary, and from 1902 to 1904 he was professor of literature in this institution. In June, 1905, Father Cavanaugh became president of the University of Notre Dame. The same year he was chosen member of the Rhodes Scholarship Committee for Indiana. He is the author of *Priests of the Holy Cross* and numerous brochures and magazine articles.

Cave, or **Cavern**, an opening in the earth, extending some distance under the surface. Caves occur chiefly in limestone rocks, sometimes in sandstone and volcanic rocks. The caves in volcanic regions are formed while the lava is in a plastic state and are undoubtedly due to the expansion of gas, on the principle that pores are formed in lava while cooling. Earthquakes also have been known to be a cause of cavernous formations, parts of the earth's crust being carried by upheaval over other parts and leaving openings in places. The most important agency in the formation of caves, however, is water. Caves formed by the action of water are usually found in limestone regions. Some of the most interesting and useful archaeological data are found in caves. These include numerous remains of prehistoric man and extinct animals.

Many caves are of great extent and are among the wonders of the world, some being remarkable for length, others for depth. Mammoth Cave in Kentucky, with its 150 m. of passageways, is the largest in the world; Frederikshall in Norway is remarkable for its depth; Fingal's Cave on the Island of Staffa off the west coast of Scotland is a famous basaltic formation; while the Luray Caverns in Page County, Va., and the Wyandotte Cave in Indiana are celebrated for their stalactite and stalagmite walls. See FINGAL'S CAVE; MAMMOTH CAVE.

Cave Dwellers, a term sometimes applied to prehistoric races who dwelt in caves. They were of a low order of civilization and are classed among the

most primitive peoples. The remains of cave dwellers are found in many places in the Old World, but there are no traces of them in America.

Cav'endish, Henry (1731-1810), an English chemist mainly known through his work on gases. Owing to his extreme reserve and timidity, the results of most of his experiments were not made known until his papers were opened after his death, and for this reason many discoveries made first by Cavendish are accredited to other sources. In his work on gases he investigated hydrogen, which he called inflammable air, and carbon dioxide, which he called fixed air because he found it to be a constituent of marble. His works are characterized by the wideness of their range and the accuracy with which he performed and recorded his experiments. Cavendish was not a university graduate, and his work was performed through his own interest in the subjects he investigated.

Cav'iar', or **Caviare**, a food delicacy prepared from the immature eggs of the sturgeon, accompanied by their enveloping membrane. It is prepared in winter on account of the difficulty of preserving it during warm weather. In making caviar, the roe, as the egg mass is called, is beaten, strained to remove the fat and fibers, and heavily salted. In this state, which, in the best caviar, is semiliquid, it is tinned or packed in kegs. It has been long used as food in Europe, especially in Russia, where the coarser varieties are staples. In France and Germany caviar is an especially popular dish and is served in a variety of forms. It is also important in the United States, where, however, its use is less common than in Europe. Since the growth of the sturgeon fisheries in the Great Lakes, caviar is made to some extent in the United States.

Cavour, Ka voor', **Camillo Benso di, COUNT** (1810-1861), a distinguished Italian statesman, born in Turin. He was educated for the army, but, having no liking for military life, he devoted himself to the study of economics and English politics and in 1831 resigned his

commission. During the next few years he made a thorough study of English political, social and industrial conditions, preparing himself for his later work in behalf of Italian independence. In 1848 he became a member of the Sardinian Parliament, two years later, minister of commerce and agriculture, and, in 1852, premier. Pursuing now a farsighted policy, Cavour sent a Sardinian force of 15,000 men to aid England and France against Russia, in the Crimean War, so that in the peace conference after the war Sardinia was accorded representation and recognition as a state. He next forced Austria into a war with Sardinia, 1859-60, the outcome of which was the accession to Sardinia, of a large part of Lombardy, and Tuscany, Modena, Parma and the Romagna. Cavour lived to see the union of all Italy except Rome and Venice, and the meeting of the first Italian Parliament. Rome and Venice were annexed after his death, but he was the real founder of modern Italy, and is to be classed with Bismarck among the great men who have won the title of "Nation Maker." See ITALY, subhead *History*.

Cawn'pore', a city of British India, the capital of a district of the same name in the Allahabad division of the Northwest Provinces. It is situated on the right bank of the Ganges River, about 140 m. above Allahabad, and is now one of the important railway centers of the country. The trade in agricultural produce and grain is significant, and important manufactures of leather, cotton goods, etc., are carried on. Since 1801 it has been an English possession and the name is now invariably associated with the Sepoy Mutiny of 1857. The district as a whole has an area of 2366 sq. m. The population of the town is 163,800.

Cax'ton, William (1422-1491), the first English printer. He was born in the Weald of Kent, England. In 1438 he was apprenticed to William Large, a London mercer, and in 1441, after the death of Large, he went to Bruges, Belgium, where he entered business on his own account. Several years later he was

governor of a chartered company trading in foreign ports. About 1471 he entered the service of Margaret, Duchess of Burgundy. While abroad, Caxton learned the art of printing, and in 1474 he put through the press a translation of Raoul de Fevre's romance, *Collection of the Histories of Troy*, the first book printed in English. In 1476 he set up his wooden printing press at the Sign of the Red Pale, in the Almonry, at Westminster, where he published, in 1477, *Dictes and Notable Wise Sayings of the Philosophers*, probably the first book printed in England. Caxton was an accomplished linguist and many of the works that he printed were translated by himself; he thus helped to fix the form of the English language and was instrumental in paving the way for the literary glories of the reign of Elizabeth. In 1877 a typographical exhibition in London commemorated Caxton and his service to England.

Cayenne, *Ka en'*, Pëpper, Red Pepper or Cap'sicum, a small upright shrub of the Nightshade Family, producing the condiment of the same name. It is probably a native of South America but is successfully cultivated in almost all tropical countries. The sprawling branches have pleasing, dark green leaves with smooth surfaces and uncut margins. These leaves are apt to be arranged in pairs, in which one leaflet is much larger than the other. The flowers are white and resemble those of the potato, a plant to which the pepper is distantly related. The pepper is cultivated for its smooth, oblong fruits of brilliant scarlet color, which, when dried and ground, form the exceedingly hot cayenne pepper of commerce.

Cecil, *Ses'il*, William, LORD BURLEIGH, Bur'ly, (1520-1598), an English statesman. Under Edward VI he was twice secretary of state, and when Elizabeth came to the throne he was made her secretary of state, a position which he held for 40 years. He was conspicuous in the Reformation in England, regulated coinage, opposed trade monopolies then existing and was responsible for the

policy that made Elizabeth's reign memorable. He was above personal prejudices in his political management, and, though shrewd and cautious, displayed prompt decision. Burleigh was a scholar of classical attainments and a voluminous writer.

Cecilia, *Se sil' i a*, Saint, the patron saint of music and of the blind. She is reputed to have been of noble parentage and betrothed to one Valerian, a heathen youth who became a martyr after his conversion to the Christian faith. Recent researches lay bare the fact that she died in Sicily between 176 and 180, and disprove the theory that she suffered martyrdom in 230 under the Emperor Alexander Severus. In 821 her bones were deposited in a church in Rome. She is said to have been the inventor of the organ and the patroness of church music. These legendary facts about her life have been the inspiration of many masterpieces in literature and art; Rubens, Raphael, Domenichino and Carlo Dolci celebrating her in pictures and Chaucer and Dryden in poetry. Another St. Cecilia, whose festival is celebrated in the Roman Catholic Church on Feb. 11, was persecuted and suffered starvation under Diocletian.

Cedar, *Se' der*, the name of a number of beautiful trees of the Pine Family, widely known since earliest times. In general they are tall, fibrous-barked trees, whose trunks are apt to have curious, irregular outgrowths at the base, resembling in miniature the buttresses of ancient cathedrals. The leaves of the cedars are all short, are much reduced and have the appearance of having been pressed; all, too, have an aromatic fragrance. The flowers are small and are either pistil-bearing or stamen-bearing, but in either case are rather insignificant; the pistillate develop small, globular cones.

The various forms of cedar are the arbor vitæ, or white cedar, the coast white cedar, the red cedar and the cedar of Lebanon. All grow in United States except the last, which is found only in northern Africa and Palestine, where for countless centuries it has been prized.

Its wood went into the Temple at Jerusalem and was also used in making temples for heathen deities. Its resin-filled lumber was capable of great resistance to decay, and ancient mummy cases of cedar are yet intact. The cedars are mentioned often in the Bible and were evidently as much prized then when they were plentiful as now when they are comparatively rare.

The woods of cedars of the United States are used for making mothproof chests, lead pencils, posts, woodenware, pails, boats, railway ties and telegraph poles. The wood is too soft and spongy to be useful in cabinetwork. See ARBOR VITÆ.

Cedar Bird. See WAXWING FAMILY, subhead *Cedar Waxwing*.

Cedar Creek, Battle of, an engagement of the Civil War, fought Oct. 19, 1864, between forces of about 30,000 men each. Sheridan had left his armies under General Wright, while he went to Washington, and the Confederate general, Early, aided by General Gordon, seized the opportunity to surprise the Federals at dawn. After a brief resistance, a large part of the Union soldiers fled, but with some difficulty Wright reformed the lines. In the meanwhile Sheridan had heard the cannonade from "Winchester, twenty miles away," where he had spent the night on his return from Washington. Galloping to the battlefield, he met his men in flight; but reforming the lines with wonderful skill and inspiring enthusiasm, he led an attack in the afternoon which not only completely routed Early, but destroyed his army as well. Cedar Creek ended the war in the Shenandoah Valley. On this battle Read based his famous poem, *Sheridan's Ride*.

Cedar Rapids, Iowa, a city of Linn Co., 98 m. n.w. of Burlington and 219 m. w. of Chicago, on the Cedar River and on the Chicago, Milwaukee & St. Paul, the Chicago & North Western, the Chicago, Rock Island & Pacific, the Illinois Central and other railroads. Four interurban electric lines connect with Iowa City, Marion, Manchester, Clinton and other towns and cities. Cedar Rapids is ad-

vantageously situated in a rich agricultural region, and the water power afforded by the Cedar River enables the city to take high rank in the value of its manufactured products.

PARKS AND BOULEVARDS. Cedar Rapids is attractively situated on terraced hills on both sides of the river, which is here spanned by several bridges. There are 70 m. of boulevard and paved streets lined with many handsome residences. The city has the longest boulevard in the state, and contains 27 parks with an aggregate of about 325 acres, including Bever Park of 70 acres, beautifully improved and containing large zoological gardens. The grounds of the Cedar Rapids Country Club comprise about 180 acres. Vernon Heights and Ridgewood, comprising 172 acres, are among the finest residence districts.

PUBLIC BUILDINGS. Among the prominent buildings are the Federal Building, Masonic Temple, Auditorium, nine banks, theaters, hotels and fine business and railroad buildings. There are a large number of handsome churches.

INSTITUTIONS. The leading educational institutions include Coe College, founded in 1881 and named in honor of a benefactor, Daniel Coe, 2 high schools, 4 junior high schools, public and private schools, a business college and a public library. The Masonic Library contains one of the finest collections of Masonic literature in the world. The benevolent and charitable institutions include several well-equipped hospitals, a home for the friendless and a home for aged women.

INDUSTRIES. The city contains extensive wholesale houses, railroad machine shops, pork-packing establishments and about 203 factories. A large percentage of the manufactures of the city is in food preparations. Cedar Rapids has a large grain trade and extensive manufactories of flour, furniture, windmills, agricultural implements, pumps, patent medicines, confectionery, dairy and creamery supplies and lumber and planing-mill products. The independent starch plant is one of the largest in the country.

HISTORY. The first settlement was made in 1838 and the name derived from the rapids in the Cedar River. The place was incorporated as a village in 1856. The city has the commission form of government. Population in 1920, U. S. Census, 45,566.

Celebes, *Sel' e bees*, an island of the Malay Archipelago, lying between Borneo and New Guinea. It is of irregular form, consisting of a small central portion having two long peninsulas stretching to the east and two broader ones to the north. This formation is due to the long mountain ranges, which lift the island from the sea and which in the north rise to a height of 10,000 ft. Forests of valuable wood, teak, oak, sandalwood, cedar, sago, clove, nutmeg and palm, cover the island. Gold, copper, tin and precious stones are also found, and coffee, indigo, cacao, sugar cane, rice, banana and tobacco are cultivated. Because of its distinctive animal life Celebes is thought to be the remnant of a submerged continent.

The people of Celebes are of several tribes, of which the Alfuros and the Bugis are most important. In religion they are Mohammedan or Christian. The island has been a Dutch possession since 1660, when it was wrested from the Portuguese. It is ruled by native princes under the surveillance of the Dutch Government. The name Celebes is properly applied to the eastern part alone; Macassar is the western section. Population, 852,000.

Cel'ery, a garden plant of the Parsley Family cultivated for its leaves and stems, which are eaten raw or used as flavoring. It is best raised in rich, black soil, preferably that of an old peat marsh. It is not difficult to raise since it grows readily, but the celery is not in demand unless it has been properly blanched or whitened. To accomplish this the growing stems must be shaded from the light by means of boards, paper or hills of earth; the latter is preferable. When this is done successfully, both leaves and stems become a creamy white and are firm and juicy. Celery is started from

seed in hotbeds and transplanted when a few inches high. When ready to ship, it is cut just below the crown of the root so that the stems of one "bunch" are all held together.

Garden celery was first raised in Germany. Its cultivation was introduced into the United States by the Dutch who settled in southern Michigan and there, in the old peat swamps near Kalamazoo, found ample field for the industry. Kalamazoo celery is famous throughout the United States, but the region about Newberry in the Northern Peninsula of the state is proving a serious rival. In a banner year Kalamazoo shipped over \$300,000 worth of celery. From July to February, the busy season, from 30 to 60 tons are shipped daily.

Celestial Sphere, *Se les' chal Sfere*, the sphere or globe which the heavens (sky) seem to form around the observer; the dome of the heavens; the vault of the sky. The heavens have the appearance of being a portion of a great sphere or globe seen from the center, so that the observer sees the inside of it. This inner surface of the celestial sphere is thickly studded with stars, the sun and the planets with their moons. The axis of the sphere coincides with that of the earth. In other words, it is the same as the earth's axis prolonged until it touches the heavens. The ends of the axis are the poles of the heavens. The celestial sphere is marked by imaginary lines, which correspond to the parallels and meridians on the earth. The celestial equator is a great circle of the celestial sphere midway between the poles of the heavens and having its plane at right angles to the axis. The sphere appears to revolve on its axis once in 23 h., 56 min. and 4.098 s., the revolution constituting a sidereal day. We speak of the rising and setting of the sun and stars as if the celestial sphere in which they are set were revolving, but this motion is due to the rotation of the earth upon its axis. Since everything upon the earth moves with the observer, he is unable to see its motion, but he can readily see the changing position of the heavenly bodies in reference to the hori-

zon, and he attributes this motion to these bodies instead of to the rotation of the earth, which is the actual cause of it. See EQUINOCTIAL; POLES OF THE HEAVENS; STARS; SOLAR SYSTEM; SUN.

Cell, a microscopic body considered as the unit of animal or vegetable structures. It is generally circular in form and made up of a cell wall enclosing a living substance called protoplasm. The protoplasm is made up of liquid and granular parts and has a darkened central portion, called the nucleus, surrounded by a nuclear wall. The nucleus in turn contains one or more nucleoli, which are comparatively large, dark bodies. The function of the nucleus is best understood in the study of reproduction of cells, in which the nucleus of the cell divides first. Cells are capable of taking up a great amount of water, and when fully expanded are quite stiff and rigid. This expansion probably accounts for the crispness of leaves and stems which have a sufficient supply of water; the loss of water from the cells causes a consequent wilt of the leaf. See PROTOPLASM.

Cellini, *Chel le' nee*, **Benvenuto** (1500-1571), an Italian sculptor and metal worker, born at Florence. He led a wandering life, plying his craft the while, and executed numerous works of art, including medallions, gold and silver repoussé and jewel work. He also designed coins for the Papal and Florentine states. His chief work as a sculptor is the bronze group of *Perseus Holding the Head of Medusa*, now at Florence. His autobiography, left incomplete at the time of his death, is one of the most famous documents of the Italian Renaissance.

Celluloid, *Sel' lu loid*, an artificial compound resembling ivory. It is used for making a large variety of articles, as it can be readily molded, stamped, turned and formed into endless shapes. It is easily colored or painted, and is used in making buttons, handles for knives, forks and umbrellas, billiard balls, backs of hairbrushes, piano keys, napkin rings, opera-glass frames, pipe stems and many other small articles; also the films used

in photography and moving-picture machines. To make celluloid, white paper is immersed in baths of nitric and sulphuric acids; afterwards it is washed, bleached, and a quantity of camphor is added. This mass, when properly heated, is passed between rollers and many articles are stamped out of the rolled sheets. Celluloid is highly inflammable and great caution is required in its manufacture.

Cel'lulose, one of the substances forming the chief parts of vegetable cells. It is manufactured in large quantities and used for various purposes in the arts. Mixed with nitric acid, it forms powerful explosives, such as guncotton, and it is an important ingredient of smokeless powder. It is also used in the manufacture of vegetable parchment, and for packing around joints of water pipes, since, when wet, it swells and prevents leaks. Cellulose is an important animal food, but does not exist in animal tissue. See GUNCOTTON; SMOKELESS POWDER.

Celts, *Selts*, a branch of the Aryan race, early driven west into Europe by successive onslaughts of the Teutons, Slavonians and other races. The earliest records of history find them the predominant race of Italy, Belgium, Switzerland, the Iberian Peninsula, France, Britain and Ireland. By the third and second centuries B. C. they were a powerful race, spreading over the entire Continent through the power of a restless energy. Only when opposed by the might of Rome did the Gauls, as the Romans called them, give way; they then became absorbed by the conquering races or retreated to remote and isolated regions. One branch of the Celtic race became the Gaelic, or Gadhelic, race represented by the Highlanders, the Irish and the Manx; another became the Cymric represented by the Welsh and the Cornish.

Traces of the Celts appear in the old stone circles, known as the Druidical Circles, still found in the groves of oak where their religious rites were performed. After their conversion to Christianity, probably before the seventh century, they made many illuminated manuscripts of the Scriptures and many arti-

cles of bronze which are still in existence.

Cements', compounds used for binding together other substances. Building cements containing lime, clay and sand were known to the Egyptians 4000 B. C. The most valuable cement and that used most generally now in building operations and in making concrete is produced by first grinding a good, pure shale clay and pure limestone into a powder, then burning the mixture at very high temperatures, preferably with coal dust and air blast. A clinker is thus formed, which, when ground fine, gives us this cement. When mixed with water and sand, the cement hardens like stone and endures for ages. Its color, usually a dark gray, resembles that of a building limestone found at Portland, England, and by the name of Portland cement this variety is known. Rosendall cement is a natural stone. Roman cement is the name applied to hydraulic mortars made by heating limestone until it is reduced to a powder and mixing it with sand. Hydraulic cement is a mortar used in building piers or walls under water.

In recent years the use of cement has been widely extended and in novel ways. By means of a specially constructed apparatus called the "cement gun," it is effectively used in the form of spray for repairing cement walls, covering frames to give them the appearance and durability of stone and for various other purposes. Statues made of cement are becoming more and more common. They are as easily made as those of plaster and have the durability of granite. The most famous concrete statue is that of the Indian chief Black Hawk, near Oregon, Ill. The statue is $43\frac{1}{3}$ ft. in height and contains about 238 cubic yards of cement. See CONCRETE; BLACK HAWK.

Cenis, Mont, *Mon Se ne'*, Tunnel of, a railway tunnel 17 m. w. of the Mont Cenis Pass in Savoy, France. This tunnel is about 25 ft. high, 26 ft. wide and nearly 8 m. long, and has two railway tracks. On the French side it enters the mountains at an elevation of 3801 ft., and it emerges on the side toward Italy 4246 ft. above the sea. Begun in 1857,

it was completed in 1871, the total cost being approximately \$13,000,000. During its construction, both the power drill and the air compressor were invented, and both were first used on this great work.

Cen'ser, a vessel for burning and wafting incense. The ancient Jews used the censer to offer perfumes in sacrifices, that for the Tabernacle being of brass, and for the Temple, of gold. The Roman Catholic and Anglican churches use censers of various forms at certain of their religious services. The original censers are supposed to have resembled a pan or small pot, with a handle at one or at both sides for the purpose of lifting them.

Cen'sors, Roman officials whose duty was the recording of property in order to ascertain the political rights of the owners. By nature of their office they speedily became important personages in the community and guarded the morals and etiquette of the community as well as the finance, the political life and the public buildings. The office was next to the dictatorship in importance.

The term is now given to a personage who examines books, manuscripts and papers before their publication in order to determine whether or not the matter contained is of treasonable or harmful character.

Cen'sus, an official numbering of all the people, including statistics of age, sex, occupation, nativity, property, etc. The Constitution of the United States provides for the national enumeration, which takes place once in ten years, and within three years of the assembling of the First Congress the first census was taken, in 1790, the work being completed under congressional auspices. In this census it was provided that free persons should be distinguished from slaves; Indians were to be excluded, and males over 16 were to be distinguished from those under that age. In 1850 an advance step was taken, and enumerators were required to add data showing the number of persons engaged in manufactures, commerce and agriculture.

The census bureau was placed under the department of the interior in 1850, and the enumerators included for the first time complete classification of the people. The returns showed the age, color, sex; the blind, deaf and dumb; the number drawing pensions, with their names and ages; and there were statistical tables of all kinds. Every later enumeration since 1850 has added materially to the list of items until reports for one census fill many volumes. The census bureau is now under the charge of the secretary of the department of commerce and labor, a department which was established by an act of Congress in 1903.

Cent, an American coin having a value equivalent to 1/100 of a dollar. The term was first used on the United States coinage in 1786 and was probably an abbreviation of the French centime. The name had been used prior to this time, but was applied to the English half-pence, which did not have the word *cent* stamped upon it. Because of this interchange of terms the cent is even yet incorrectly spoken of as the penny. From 1793 to 1857 there were seven different cents coined, some of which are now very rare. Since 1909 the Lincoln cent, or one bearing the head of Lincoln upon one side and two disconnected plumes upon the other, has superseded the familiar cent bearing the Indian head and the wreath.

Centaur, *Sen'tor*, one of a fabled Thessalian tribe, half man, half horse, which dwelt about Mt. Pelion. The Centaurs were popularly supposed to be the offspring of Ixion and Nephele, the rain cloud. As they were on the most friendly terms with men, they attended the marriage of Pirithöus and Hippodamia, where some became intoxicated and insulted the bride. Many were slain in the quarrel that ensued. The Centaur is a favorite subject in ancient art and literature.

Centennial Exposition, an international exhibition of arts, manufactures and products, held in Philadelphia in 1876, to commemorate the centennial of

the independence of the United States. Fairmont Park was chosen as the place to hold the fair, and within an area of 236 acres, some 200 buildings were erected, important among these being Machinery Hall, Main Exhibition Building, and Memorial, Horticultural and Agricultural halls. The aggregate cost of these buildings was about \$4,500,000, and Memorial Hall, having been constructed of permanent materials, is still used as a museum. The National Government invited all foreign nations which had diplomatic relations with the United States to send products of their industries, and in consequence 33 nations besides the United States were represented in the exhibits. The exhibition opened May 10, with imposing ceremonies, and during the 159 days that it continued there was a grand total of 9,910,966 admissions. Pennsylvania Day, Sept. 28, was the best attended, when 274,919 persons entered the grounds. Cash receipts totaled \$3,813,725. By showing to Americans the superiority of certain European products and by disclosing to Europeans the manufacturing and commercial development of the United States, a salutary effect was produced, and the Centennial was conceded the most comprehensive international exhibition thus far held.

Cent'ner of Grav'ity. See GRAVITY, CENTER OF.

Centipede, *Sen'ti peed*, a family of the group Chilopoda, formerly united with the Millipede in a class called Myriapoda; it was given its name because of the numerous legs possessed by each individual. The body is long, flattened and segmented, and although it has by no means 100 segments and only one pair of legs to a segment, the name centipede does not seem an exaggeration. Centipedes are found in all parts of the United States. Those of the North are small and harmless; they live under stones, logs or the loosened bark of trees and feed upon insects. Those of the South are equally harmless, but are larger and live hidden in houses where they make themselves useful by killing cockroaches.



GUATEMALA. (1) Native villagers assemble to greet new bishop. (2) Zutuhuile Indians, being without firearms, are forced to capture ducks with stones. (3) Lake Atitlan, at an altitude of 5,000 feet, in the heart of the Real Indian country. (4) Near San Juancito. (5) Court scene. (6) United States Consulate, San Juancito.



CENTRAL AMERICA. (1) Panama dwellings. (2) Balboa. (3) Street scene in Panama.

The centipedes of tropical countries are poisonous and exude poison from glands which open through the claws of the first pair of legs. The bite, or scratch, of these centipedes is very painful and often fatal.

Cen'tral Amer'ica, a term indefinitely applied to the narrow connecting territory between the continents of North and South America. It is generally understood to include Guatemala, British Honduras, Honduras, Salvador, Nicaragua, Costa Rica and the Republic of Panama, but some authorities add to this that part of Mexico south of the Gulf of Campeche or even all of Mexico. Still others apply the term only to Guatemala, Honduras, Salvador, Costa Rica and Nicaragua. The Caribbean Sea and the Pacific Ocean are its east and west boundaries respectively.

SURFACE AND CLIMATE. Physically, this territory is a mountainous region, having many active and extinct volcanoes. Earthquakes and volcanic eruptions are of frequent occurrence and are often very destructive. Because of the mountains and the narrow extent of the territory, the rivers are short and rapid, hence of little avail for navigation. The San Juan in Nicaragua is the outlet of the great Lake Nicaragua, in the abandoned line of the proposed Nicaragua Canal. Along the coast the climate is hot, moist and generally unhealthful; in the higher altitudes grains are raised and forests of mahogany, cocoa, rubber and coconut occupy the slopes at various heights. There are probably many kinds of minerals to be found in Central America, but gold alone is mined to any extent. Agriculture is the leading industry and the products chiefly raised are indigo, sugar, tobacco, coffee and fruits.

The people are of Indian and Spanish descent, although many immigrants have been attracted by the great plantations and the advantages offered to municipalities and public enterprises. The prevailing religion in most of the countries is Roman Catholic, although freedom of religious belief is tolerated everywhere. Education is free and compulsory.

HISTORY. The coast of Central America was first seen by Columbus in 1502. After 1513 part of Costa Rica was conquered by Pedro Arias de Avila; in 1524 Alvarado subdued Guatemala; and Salvador and Cortez, the following year, completed the subjugation of the remaining tribes. All Central America constituted the captain-generalcy of Guatemala till 1821, when Guatemala declared its independence. In July, 1823, the five audiencias, or states, formed the Republic of the United States of Central America. From the first there was a bitter struggle between the Federalists and Conservatives, and the union was dissolved in 1839. In general, Costa Rica took small part in political affairs, and from the union of the states, 1842-1845, it alone was excepted. In 1850 Honduras, Salvador and Nicaragua unsuccessfully attempted to restore the republic, as did President Barrios of Guatemala in 1885. The Greater Republic of Central America, 1895, was a peaceful but short-lived union between Nicaragua, Salvador and Honduras.

As the result of efforts on the part of the United States and Mexico to bring harmony into the isthmus, a Central American Court of Justice was established by the peace convention, which was in session at Washington, D. C., Nov. 14-Dec. 20, 1907. On May 26, 1908, this court opened at Cartago, Costa Rica, peacefully settling troubles which would formerly have led to hostilities. Jan. 20, 1909, there was a meeting at Tegucigalpa, Honduras, and on Jan. 1, 1910, one at San Salvador. Through colonization, British Honduras, or Belize, was established in 1850, the same year that England relinquished its protection over the Mosquito coast.

The area and population of the Central American countries are as follows:

	Area	Population	Capital
Costa Rica	23,000 sq. m.	441,342	San Jose
Guatemala	48,290 sq. m.	2,003,579	Guatemala la Nueva
Honduras	46,250 sq. m.	562,000	Tegucigalpa
Nicaragua	49,200 sq. m.	703,540	Managua
Salvador	7,225 sq. m.	1,271,336	San Salvador

Central Falls, R. I., a city of Providence Co., 5 m. n. of Providence, near

Pawtucket, on the Blackstone River and on the New York, New Haven & Hartford Railroad. It has extensive woolen, cotton, silk and haircloth mills and manufactories of machinery, paper boxes, leather, glue, jewelry, tools, bobbins and shuttles, copperware and thread. Electric railways connect with all the nearby towns and cities. Central Falls formed part of the town of Lincoln until its incorporation in 1895. Population in 1920, U. S. Census, 24,174.

Centra'lia, Ill., a city of Marion Co., 62 m. e. of St. Louis, Mo., and 252 m. s.w. of Chicago, on the Illinois Central, the Chicago, Burlington & Quincy, the Missouri & Illinois and the Southern railroads. The town is situated in the center of a rich fruit-growing country and has a large trade in apples, peaches and strawberries. It has glassworks, coal mines, flour mills, railway repair shops, marble yards and manufactories of ice, boxes, crates, knit goods, rails, iron and steel. There are many school buildings and churches and a Carnegie library. Centralia was first settled in 1853 and was incorporated in 1859. Population in 1920, U. S. Census, 12,491.

Centralia, Wash., a city of Lewis Co., 4 m. n. of Chehalis, the county seat, and 35 m. s. of Olympia, on the Northern Pacific, the Great Northern and other railroads. About one-fourth of Lewis Co. is within the Rainier forest reserve. The chief industry is the manufacturing of lumber products. There are also metal and coal deposits in the vicinity. Agriculture, including fruit culture and dairying, takes the place of the forests as they are removed. Centralia has a large city hall, business houses, several banks, about ten churches and excellent schools. The city contains extensive sawmills, shingle mills, sash and door factories and other woodworking plants. The climate is mild. With the development of the lumbering interests the town has had a rapid growth. Population in 1920, U. S. Census, 7,549.

Cen'tury Plant. See AGA'VE.

Cephalopoda, *Sef'a lop'o da*, a class of Mollusks, whose name, meaning head-

footed, has been given because of the peculiar arrangement of the body of all types in this group. The foot has grown forward and upward until it surrounds the head and is there subdivided into numerous arms or tentacles. Above, the tentacles are fitted with tiny suckers which aid the animal in grasping and holding its prey; below, the edges of the foot have been joined in such a manner as to form a funnel or tube through which water is ejected from the mantle cavity. This expulsion of water also serves as a means of locomotion, for the force of the ejection propels the animal rapidly backward. The body is always protected by a leathery skin, and in some, as the squid and the cuttlefish, the massed ganglia, representing the brain, is covered by a bony box, or skull. The special senses, especially sight and smell, are well developed. Since Cephalopoda are aquatic, breathing is by means of gills. See SQUID; CUTTLEFISH; PAPER NAUTILUS; CHAMBERED NAUTILUS.

Ceramics, *Ser'am'iks*. See POT'TERY.

Cerberus, *Ser'ber us*, in mythology, the dog of Pluto that guarded the gate of Tartarus, the region of the dead, fawning on those who entered, but devouring those who attempted to escape. He is described as having three heads and a tail and a mane of coiling venomous serpents. He was bound with 100 chains and, when loosed, could not be restrained even by the Furies.

Cerebellum, *Ser'e bel'um*. See BRAIN.

Cerebrum, *Ser'e brum*. See BRAIN.

Ceres, *Se'reez*, (in Greek, Demeter), daughter of Saturn and Rhea, and mother of Proserpine (Persephone), was goddess of harvests and protected all agriculture. When Pluto stole her daughter she was frantic, and, on learning that Jupiter had consented to the abduction of their child, she not only left heaven, but prevented the earth from yielding its harvests. Jove feared a famine; consequently he sent Iris to bring Ceres back to Olympus. Not until it was settled that her daughter was to spend two-thirds of each year with her,

did the angry goddess comply. Only then, too, did the earth again bring forth its fruits. Ceres was supposed to be stately, matronly and of a gentle disposition. Her usual symbols were ears of corn and poppies, in a garland or spray. Many times she appeared in a chariot drawn by winged dragons.

Cereus, *Se're us*, a name given to a number of members of the Cactus Family, many of which are common in cultivation. Like all cacti, they have thickened, fleshy stems capable of storing



CERES

moisture for a long time. In the cereus the stems are cylindrical or rarely swollen at the center and grooved in vertical lines; the ridges thus formed are set at regular distances with tufts of soft, or slightly prickly, hairs. Leaves are lacking or are reduced to mere spines which in many varieties are scarcely noticeable.

The blossoms grow from the side of the stem and are borne on a scaly, spreading tube. There are many yellow, rose-colored or white, spreading petals which vary in size and shape in different species.

The flowers of some species of cereus open in the morning and close at night-fall, others open at midday and last only about six hours, and still others, known as the night-blooming cereus, open at night and wither before daybreak; this last species is fragrant and has only white flowers. The old-man cactus is a cereus which has long, white fibers hanging from the tops of the stems. A serpent cereus has a creeping, cylindrical stem, yellowish-green in color, and is very aptly named.

Cerro Gordo, *Ser' ro Gor' do*, Battle of, an engagement of the Mexican War, fought Apr. 17 and 18, 1847, between 8500 Americans, under General Scott, and 12,000 Mexicans, under Santa Anna, at a difficult mountain pass on the national road from Vera Cruz to the City of Mexico. Santa Anna had fortified all of this pass save Atalaya Heights, which overlooked his position but which he deemed inaccessible to the enemy. Actual fighting began on Apr. 18 when Scott, having gained the bluff, fired with heavy guns upon the Mexican fortification, as General Twiggs and Colonel Baker attacked their rear. Santa Anna soon fled, losing 1200 men, while the Americans lost 431 men.

Cervantes Saavedra, *Ser van' teez Sah' ah va' drah*, Miguel de (1547-1616), a Spanish novelist and poet, born in Alcalá de Henares. When he was seven years old his parents removed to Madrid, where he followed an irresistible inclination to write poetry, producing elegies, ballads and sonnets. At the age of 21 he removed to Italy, and became page to the Cardinal Giulio Acquaviva, in Rome. He served in the war against the Turks and African corsairs and showed great courage in the Battle of Lepanto in 1571. Captured by pirates in 1575, he was sold in Algiers as a slave, but was ransomed by his friends at the end of

five years. He now returned to Spain and devoted himself to literary work.

Cervantes' dramatic productions, between 20 and 30 in all, were not successful, but in 1605 appeared the first part of the novel which immortalized his name, *Don Quixote*. Intended first as a short story, the narrative grew on his hands until with the completed work he had a brilliant satire on contemporary Spanish society. *Galatea*, a pastoral novel, and the tragedy *La Numancia* are among his other writings. See DON QUIXOTE.

Cervera Y Topete, *Ther va' rah E To-pa' tay*, **Don Pascual de** (1839-1909), a Spanish admiral, born in the Province of Cadiz and graduated from the San Fernando Naval Academy in 1851. He served with distinction in the campaign against Morocco, took part in an expedition against Cochin China and subsequently was attaché of the Spanish legation at Washington. As captain, he commanded a vessel to Peru in the war of 1866 and blockaded Cuban ports at the opening of the Ten Years' War in Cuba, 1868-78. Being then recalled, he was made secretary of the navy, was adjutant to the Queen Regent and was sent to the European Naval Conference at London, 1891.

Though vigorously opposing war with the United States, Cervera commanded a squadron of seven cruisers and torpedo boats, which reached Santiago de Cuba about May 19, 1898. There he was blockaded by an American fleet under Admiral Sampson, and while attempting to escape, under orders, July 3, all of his vessels were sunk or destroyed and he himself captured. Until Sept. 12 he was held in the United States, where he was practically considered a guest, and on his return to Spain he was court-martialed and acquitted, July 7, 1899. In 1902 he became chief of staff of the navy, in 1903 he was made a life senator and four years later became chief of the maritime District of Ferrol. He lived in retirement for two years before his death.

Cetacea, *Se ta' she a*, an order of

marine Mammals including the dolphins, narwhals, porpoises and whales. Members of this order are large animals, and, unlike most Mammals, are practically hairless; instead the skin is protected internally by a layer of fat called blubber, which serves to keep the temperature of the body even and to lessen the relative weight. Their bodies are unwieldy, having large heads, short necks and tails terminated by broad, horizontal fins. The vertebrae of the neck are unusually joined, and there is no collar bone. The forelimbs are paddlelike and are used for swimming; for this reason the finger bones are more numerous than in most Mammals. In the tapering body there is no trace of any formerly-used hind limbs, although it may be that members of this group had the regular number of limbs and used them on land as well as on sea. The stomach has four compartments, and is an important organ indeed to these animals that must often go without food for a long time and must prepare their bodies to resist great cold. The brain is also large but not especially keen. There are two main divisions of the Cetacea—the toothed whales and the toothless, or whalebone, whales. See WHALE; GRAMPUS; PORPOISE; DOLPHIN; NARWHAL; ZOOLOGY, subhead *Classification*.

Cetinje, *Tset' in ya'*, **Cettinje** or **Cettigne**, the capital of Montenegro, located in a high mountain valley, 25 m. n. of Antivar, its seaport upon the Adriatic. Its location renders it especially isolated, since it is frequently snowed under in winter and subject to damaging floods. Cetinje, though the capital of the principality, is little more than a fortified village, but there are a few public buildings of importance; these are the palaces, the foreign legations, several schools of note, a library, a theater, a museum and a hospital. The little town has withstood many sieges from the Turks, but has seldom been held by them for any length of time. Population, 4500.

Cévennes, *Sa'ven'*, a range of mountains of southern France forming the

southwestern boundary of the central plateau. They lie chiefly west of the Rhône between the Alps and the mountains of Auvergne. Many of the rivers of France, as the Loire, the Tarn, the Aveyron and the Gard, rise in these mountains, and in the south are many extinct volcanoes. After the revocation of the Edict of Nantes, many Protestants found refuge in the Cévennes.

Ceylon, *Se lon'*, a beautiful island of the Indian Ocean lying s. e. of India and poetically called the "pearl on India's brow." Set in the blue southern waters, its yellow beaches, green lowlands, luxuriant forests of palm and lofty purple mountains make it a picture of unsurpassed beauty as it is approached by sea, and render plausible the legend that Adam chose this as his second home, since it ranked next to Eden in loveliness. The little chain of coral islands that seem to connect Ceylon with the mainland keep alive this legend in their name, Adam's Bridge.

The soil of the island is fertile and vegetation is luxuriant. The mountains are heavily forested but the tea gardens and groves of rubber trees are the most characteristic sight. Ceylon has long ranked third as a tea-producing country and recently has become important for its rubber industry. The climate is healthful and pleasant and in the hill region numerous sanatoriums have been located.

One of the great industries of the island and one for which it has been noted for over 2000 years is its pearl fisheries. These, though once a great but uncertain source of revenue, have been rendered stable by scientific investigation and treatment. Precious stones, as rubies and sapphires, and the minerals, gold, iron and graphite, are mined. Ceylon is probably among the oldest inhabited countries, and the remains of ancient temples, cliff-hewn shrines and carved memorials are everywhere in evidence. Since the British occupancy of the island, the old city of Anuradhapura has been excavated and proof found of its existence in a high state of civilization during the time of Christ. Two of

the most famous of the ancient temples are the Temple of the Sacred Tooth at Kandy, now containing an ivory representation of the relic of Buddha which was once guarded there; and the Temple of the Footprint, built high on Adam's Peak near Halton, 7353 ft. above the sea.

The dominant native class in Ceylon is the Singhalese, a fine-featured, well-formed people of the Negro race; they are of Buddhist faith and are intelligent and industrious. The remainder are the Tamils, a tribe which once overran Ceylon from the mainland, and Arabs and Europeans. The chief cities are Kandy, Colombo (the capital and chief seaport), Jaffna and Point de Gallis. Ceylon has been a possession of England since 1796. Population, 3,592,400.

Chad'wick, George Whitfield (1854-), an American composer, born at Lowell, Mass. After studies at home and abroad, he became, in 1880, instructor in the New England Conservatory of Music and, later, director. For many years he has conducted the music festivals of Springfield and Worcester, Mass. His most noteworthy work is the lyric drama *Judith*, written in 1901, and pronounced a conspicuous example of the oratorio of the century in which it appeared. Among the composer's other works are *The Vikings' Last Voyage*; the overtures *Rip Van Winkle*, *Euterpe*, *Melpomene*, *Adonais* and *Thalia*; and a *Columbian Ode*, written for the opening of the World's Fair at Chicago in 1893.

Chaff Cutter, a machine for cutting hay, alfalfa and other fodder in suitable lengths to mix with corn, oats or bran as a stock food. There are two patterns in general use. The simpler pattern consists of a trough, or box, open at the top and ends for receiving the material, and a knife worked up and down by hand as a lever. When the knife is raised, the fodder is pushed under it and is cut as the knife descends. These parts are mounted on a frame about three feet high. The second pattern has the knives attached to a roller, which is turned by

a crank attached to a heavy balance wheel, or it may be operated by a gasoline engine or other motor, to which it is attached by belt and pulley.

Chaf'fee, Adna Romanza (1842-), an American soldier, born in Orwell, Ohio. He was educated in the public schools. Entering the army at the beginning of the war, he was promoted in 1865 to the rank of first lieutenant, and his bravery at Dinwiddie Courthouse won for him the brevet rank of captain. In 1897 he was made lieutenant-colonel. He fought in the Spanish-American War and was appointed major-general of volunteers for his gallantry at El Caney. He commanded the United States forces in the Peking campaign of 1900 and had command of the army in the Philippines in 1901. For two years he was chief of staff of the United States army. He retired from active service in 1906.

Chaf'fey, George (1848-), a Canadian engineer, born in Ontario. While a youth he engaged in shipbuilding and worked on the Canadian lakes, and in 1881 he and his brother, W. B. Chaffey, removed to southern California, where they founded the "model colony" of Ontario. He was instrumental in making Los Angeles, Cal., the first municipal district of the United States to be lighted by electricity and in establishing the irrigation colonies of Mildura, Victoria and Renmark, South Australia. Returning to California in 1900, with his son Andrew he reclaimed a section of the Colorado Desert by means of a canal which carried the waters of the Colorado River of California through 55 miles of Mexican country. Imperial Valley, as Chaffey named this district, now a county of California, is today the center of 300,000 acres of irrigated land. Mr. Chaffey is president of the First National Bank of Ontario and is associated with numerous other banks and corporations. With his brother, he established and endowed the Chaffey College of Agriculture.

Chain, a substitute for a cord or rope, formed of metal links, generally of iron,

steel or brass, if for useful purposes, and of gold, silver, platinum or bronze, when used for ornaments. The links are of various shapes, round, oval and square, and when strength is required they are welded or soldered together. Chains have many uses, such as support, connection, restraint and the transmission of power for mechanical operations in the form of link belting. Formerly chains were made by hand, but now the machine-made chain is found everywhere, as it is lighter, more uniform, both in the shape and the weight of its links, and stronger.

Chaise, Shaze, an almost obsolete word, used to designate a light, two-wheeled, one-horse vehicle for two persons, with a movable hood, or top. It was sometimes applied also to light four-wheeled vehicles. In the 18th and early 19th centuries, the *post-chaise* was in general use. This was a closed four-wheeled carriage, often drawn by four horses, with the driver riding postilion. Among Oliver Wendell Holmes's best-known poems is that of *The Wonderful One-Hoss Shay*.

Chalcedony, *Kal sed' o ny*, a crystal-line variety of quartz, transparent, or partly so, of various shades of yellow, brown, green and blue. Some varieties are white and opaque and are known as white agate. Other varieties are chrysoprase, heliotrope, or bloodstone, onyx, sardonyx, plasma and carnelian. Chalcedony has a bright luster and takes a high polish, and is used for brooches, seal-stones and other ornamental purposes. A notable formation occurs in Chalcedony Park, Arizona, in which petrification of trees takes the form of chalcedony, formed by siliceous waters which have replaced the woody fibers of trees with deposits of silica. See PETRIFIED FORESTS.

Chaldea, *Kal de' a*, a name first applied to a district southeast of Babylonia, on the Persian Gulf. Later the name came to have a more extensive application and was used to designate the whole country of Babylonia. The Chaldeans were probably of Semitic origin, and are

supposed to have emigrated from Arabia at a very early date and to have settled in the neighborhood of "Ur of the Chaldees." They carried on aggressive warfare against the other Semitic Babylonians for centuries, and after the downfall of Assyria, Chaldea became supreme in Mesopotamia. The rise of the later Babylonian Empire under Nebuchadnezzar tended to unite the Chaldeans and Babylonians, so that apparently no differences existed between them. Consequently the name Chaldean in later days came to be used synonymously with Babylonian. In the book of *Daniel*, the name Chaldean is applied both as a race name and as a designation of the Babylonian priestly class. See BABYLONIA.

Chaleurs, Sha loor', Bay, an inlet of the Gulf of St. Lawrence, partly separating New Brunswick from Quebec. Its length extends from east to west about 85 m., and its maximum width is over 20 m. It is from 100 to 250 ft. deep and affords good anchorage for vessels and easy access to the land. A large number of streams flow into the bay. There are several towns along the shore, and fishing is the principal industry. It received its name ("Bay of Heat") from the fact that Jacques Cartier entered it in 1535 in the hottest month of the summer.

Chalice, Chal' is, the name applied originally to a drinking cup, but now used to designate the vessels holding wine used in the administration of the holy sacrament, or Eucharist.

Chalk, a soft variety of limestone occurring in white, grayish, yellow and red formations. Chalk is formed by the accumulation of myriads of tiny shells, and when viewed under the microscope, it presents a beautiful appearance. Pure chalk is white, and other colors are caused by impurities. Chalk occurs in large quantities, especially in England and that part of France bordering on the English Channel and Dover Strait. The white chalk cliffs of England gave that land the ancient name of Albion. Under the city of London there are deposits of chalk from 600 to 800 ft. in thickness. In the United States it is found in large

quantities in Arkansas, Texas, Iowa, Montana and some other states. The Texas deposit is estimated to be 250 m. long and nowhere less than 600 ft. thick.

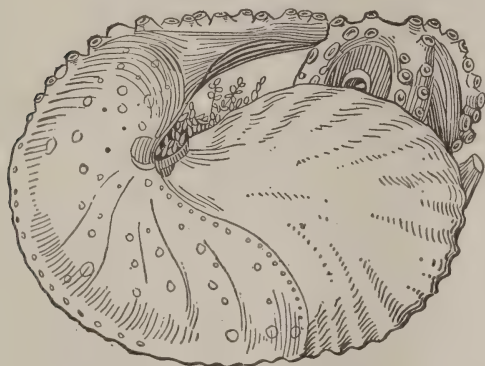
Chalk is sometimes used as a building stone, since it hardens when exposed to the air. It is also used in the manufacture of cement. When purified and ground, it is used in whitewash; when ground to a fine powder and freed from grit, it forms whiting, used in making putty. Under the names of "Gilders White" and "Paris White," it is used in polishing silver. It is sometimes used for improving the soil. When used for marking on blackboards, it is made into crayon (See CRAYON). The geological age in which chalk was formed is known as the Cretaceous Period. See GEOLOGY.

Chalmers, Chah' merz, Thomas (1780-1847), a great British preacher and the founder of the Free Church of England. He was educated at the University of St. Andrews and became an ordained minister in 1803. When he went to Glasgow in 1815, the whole city was stirred by his preaching. In 1823 he accepted the offer of the chair of moral philosophy at St. Andrews. In 1828 he became professor of theology at Edinburgh and in 1833 he published his treatise *Adaptation of External Nature to the Moral and Intellectual Constitution of Man*, a work which obtained him many literary honors. The next year he became convener of the Church Extension Committee and he labored enthusiastically in this capacity for seven years.

During this time differences had arisen in the Church, and in May, 1843, Chalmers and 470 other clergymen withdrew. He was active in forming and organizing the Free Church and was elected president of the Free Church College. Chalmers was without a rival as a religious orator; he combined in a rare degree, intellect, a vivid imagination, common sense and executive ability.

Chambered Nautilus, Chame' berd Nawt' i lus, or **Pearly Nautilus**, a family of Cephalopods related to the cuttlefish. When young, members of this family occupy a simple shell, but as they

grow, more chambers are added, and a flat, coiled shell is formed. This cell is composed of two layers, the outer of which is of porcelain and the inner of mother-of-pearl. The nautilus lives in the outer chamber of the shell, but maintains connection with the chambers previously formed, by means of a long, hollow tube, called the siphuncle. These inner chambers are filled with gas, which gives the shell lightness but does not raise it to the surface. The nautilus is found in deep waters of Asiatic seas, where it feeds upon small sea animals. Its long



CHAMBERED NAUTILUS

tentacles extend stiffly from the shell and are quick to grasp their prey.

The chambered nautilus is the theme of the poem of the same name, written by Oliver Wendell Holmes.

This is the ship of pearl, which, poets feign,

Sails the unshadowed main,—

The venturous bark that flings

On the sweet summer wind its purpled wings

In gulfs enchanted, where the Siren sings,

And coral reefs lie bare,

Where the cold sea-maids rise to sun their streaming hair.

.

Year after year beheld the silent toil

That spreads his lustrous coil;

Still, as the spiral grew,

He left the past year's dwelling for the new,

Stole with soft step its shining archway through,

Built up its idle door,

Stretched in his last-found home, and knew the old no more.

Chamberlain, Chame' ber lin, Joseph (1836-1914), an English statesman. He was educated at the London University. In 1854 he became a partner in a screw manufacturing business in Birmingham, retiring in 1874 with an ample fortune. In the meantime, he had become known as a public speaker, and had been elected three times mayor of Birmingham. In 1876 he entered Parliament for the city and under Gladstone became president of the Board of Trade. As he differed with Gladstone in his Irish policy, he resigned. In 1888 he was sent to America to settle the fishery disputes between Canada and the United States, and later became a colonial secretary in the government of the Marquis of Salisbury. Mr. Chamberlain advocated the federation of the British Empire, with home rule for the colonies. He had a large share in the events leading up to the South African War. His tariff policy in 1903, which advocated a tax on all imports except those from British colonies, was not adopted.

Chamber of Commerce. See COMMERCE, ASSOCIATIONS OF.

Cham'bers, Edward Thomas Davies (1852-), a Canadian author, born in England. In 1870 he came to Canada and engaged in school work till he established the *Progress* (St. Andrew's, P. Q.), 1872. Later, in Quebec, he served successively on the staff of the *Daily Chronicle*, was editor of this paper, of *The Mercury* and of the *North American Notes and Queries*. Moreover, he has contributed many articles on the early history of Canada, on the scenery and resources of northern Quebec and on hunting and fishing in northeastern Canada and in Newfoundland, on all of which subjects he is considered a high authority. From 1884 to 1894 he sat as an alderman for Quebec, of which city he was for a time pro-mayor. Chamber's separate works include *The Haunts of the Ouana-*

niche, Quebec, Ancient and Modern and The Anglers' Guide to Eastern Canada.

Chambers, Ephraim (1680-1740), an English encyclopedist, born in Kendal. From map and globe making he turned to compiling an encyclopedia, a general reference work on a larger scale than any then in existence in England. The first edition of the *Cyclopaedia, or an Universal Dictionary of Arts and Sciences*, was published by subscription in 1728, and was followed by several revisions after the author's death.

Chambers, Robert William (1865-), an American author and artist, born in Brooklyn. From 1886 to 1893 he studied in the Julien Academy, Paris, first exhibiting in 1889, and he has illustrated for such periodicals as *Life, Truth and Vogue*. His writings include *The King in Yellow, The Maker of Moons, The Cambric Mask, Cardigan, The Maid-at-Arms, The Fighting Chance, Tracer of Lost Persons, The Firing Line, The Danger Mark, The Green Mouse and Ailsa Paige*. His drama, *The Witch of Ellan-gowan*, was written for Miss Ada Rehan, who played it at Daly's Theater.

Chambersburg, Pa., county seat of Franklin Co., 52 m. s.w. of Harrisburg, on Conococheague Creek and on the Cumberland Valley and the Western Maryland railroads. It is finely situated in the fertile Cumberland Valley and is an important trade center. In the vicinity are Wolf Lake, Mont Alto and Pen Mar parks. Wilson College and Penn Hall, Schools for women are located here. Chambersburg has the shops of the Cumberland Valley Railroad and manufactories of chains, electric, engineering and bridge supplies, furniture, paper, milling machinery, flour, leather, farm implements and other articles. The town was first settled in 1730 by Benjamin Chambers and was for many years called Falling Spring. In Early's Raid, July 30, 1864, the city was burned, but it was almost entirely rebuilt after the Civil War. Population in 1920, 13,171.

Chameleon, Ka me' le un, a name applied to a number of species of lizards, and in the Old World, to a widely differ-

ent class from that indicated in America. The American chameleon is a member of the Iguana Family and resembles a small alligator, with its large head, long, slender tail and flattened toes; by having four toes upon each foot this species differs from all other lizards. The body has tiny scales and the head is enlarged by a ridge above the forehead and a loose fold of skin beneath the chin, which in the males may be widely expanded. Members of this genus are found in America from the Atlantic coast to Texas and in Mexico and Cuba; they are often sold as pets and are interesting little creatures to watch; if an insect flies past, quick as a flash their long tongues dart out and the fly is caught without hope of escape; this capture is rendered less uncertain by the presence of a sticky, viscid liquid upon the chameleon's tongue which holds the victim as tightly as any man-prepared fly paper.

The chameleon is chiefly noted for its change of color from green to brown, red and intermediate shades. These changes are due, not as is commonly supposed, to the color of the object upon which the lizard rests, but to change of temperature and light or to sensations of anger, fear and weariness.

The chameleons of the Old World comprise a separate family. They have larger, high bodies, marked with beadlike points, and short, prehensile tails. Their large, bulging eyes have the peculiar power of acting independently, so that one may roll up while the other turns from side to side. The feet are especially fitted for grasping and act like pliers. Like all lizards, both of these chameleons have the power of detaching their tails in order to distract an attacking enemy's attention. See LIZARD.

Chaminade, Sha'me'nad', Cecile (1861-), a French musical composer, born at Paris. At the age of eight her talent displayed itself in some sacred music, which attracted the attention of Bizet. She has been a prolific writer of songs and instrumental pieces, many of which are fresh and original, and deserving of their wide popularity. Mlle. Cha-

CHAMOIS

minade made a tour of America in 1908. *The Flatterer* and *Scarf Dance*, among her instrumental pieces, and *Madrigal*, *Rosamunde* and *Berceuse*, among her songs, are favorites.

Chamois, *Sham' y*, a small mountain animal of southern Europe which belongs to the goat-antelope tribe of the Bovine Family. It is a light, agile animal with slender, brown body, paler in summer than in winter, pale yellow head striped with brown, and short, black tail. The hind quarters and inside of the hind legs are white. The ears are erect and very keen, as is also its sense of sight. The chamois travel in herds upon almost inaccessible rocks; when feeding, one in-



CHAMOIS

dividual is set as watchman to spy out an approaching enemy. When one appears the entire herd will leap across wide chasms or down nearly perpendicular rocks to escape. The skin of the chamois, which in life is covered by a shaggy coat of hair, is used in the production of a soft, flexible leather known also as chamois or shammy.

Chamomile, *Kam' o mile*, or *Camo-mile*, a European weed of the Composite Family introduced into the United States because of its value as a tonic and

CHAMPION

a narcotic. It was used especially by herb doctors, who brewed from it an all-powerful but extremely disagreeable "chamomile tea." The plant resembles our common mayweed and is often confused with it. It differs from it, however, in having a hairy stem and scentless or pleasantly-scented foliage. The stem may be erect or bent and bears many finely-divided leaves. The flowers are in heads, surrounded by white petal-like rays, and bloom from July to September. Chamomile grows wild in dry, cultivated fields or is occasionally cultivated for medicinal purposes.

Champagne, *Sham pane'*, a wine made from grapes. It gets its name from the former Province of Champagne, France, now in the Department of the Marne, of which Rheims is the manufacturing center, and from where the best of these wines come. Most excellent champagnes of the sparkling and still varieties were produced in California and in Germany. A champagne, when not sweetened, is known to the trade as dry. Champagne contains a large percentage of alcohol, and is strongly intoxicating. See WINE.

Champaign, *Sham pane'*, Ill., a city in Champaign Co., 128 m. s.w. of Chicago, on the Illinois Central, the Cleveland, Cincinnati, Chicago & St. Louis, a branch of the Wabash and Illinois Traction System. It is the twin town of Urbana, is situated in a rich agricultural region, of which it is the trade center, and has extensive foundries, railroad shops and ice and cold-storage plants. The town contains the Burnham Athenæum Library, 2 hospitals and several parks. Settled in 1855, Champaign was incorporated in 1860. Population in 1920, 15,873. See URBANA, ILL.; ILLINOIS, UNIVERSITY OF.

Champion, *Cham' pi un*, a warrior or knight of superior power and skill. A champion usually advocates the cause of another. In ancient times armies had their champions who challenged each other, and the issue of the battle was sometimes decided by the result of the fight between the champions. See DUEL.

Champlain, *Sham plane'*, Samuel de (1567-1635), a noted French explorer and colonizer, born at Brouage. In 1603 he accompanied an expedition sent to choose a site for a settlement in New France, and at this time explored the St. Lawrence and Saguenay rivers. The next year he came to America with De Monts, exploring, during the next three years, the Bay of Fundy and part of the New England coast. Coming to New France as lieutenant-governor in 1608, Champlain in this year laid the foundations of Quebec. In 1609 he accompanied a band of Montagnais, Huron and Algonquin Indians against the Iroquois, and at this time discovered the lake which bears his name. On July 30 he helped defeat a band of Mohawks, an act which definitely committed France to the policy whereby she lost forever the friendship of the Iroquois. In 1611 Champlain established a trading post on the site of the present Montreal. Two years later he journeyed as far as Allumette Island up the Ottawa, and in 1615 with a party of Indians crossed the eastern ends of lakes Huron and Ontario. Thereafter he devoted himself to the development of New France, making yearly trips to France in behalf of the cause. Champlain was the real founder of the French power in the New World, and well deserved his title "Father of New France." His complete writings in six volumes were published in 1870 under the patronage of Laval University.

Champlain, Lake, a large lake lying between northern New York and Vermont and extending for some distance into Canada. Its length is 120 m., and its width varies from less than a mile to 14 m. Its area is about 750 sq. m. The lake has many beautiful islands, and the scenery along the shore is unusually attractive, with the distant Adirondacks on the west and the Green Mountains on the east. It drains into the St. Lawrence by means of the Richelieu River and is connected with the Hudson River by means of Champlain Canal. Burlington, Vt., and Plattsburg, N. Y., are situated upon its shores, and on the lake near the latter

city was fought the Battle of Lake Champlain in the War of 1812.

Chan'cellorsville, Battle of, a famous engagement of the Civil War, fought May 1 to 4, 1863, between 100,000 Federals, under "Fighting Joe" Hooker, and 90,000 Confederates, under General Lee. The Confederates were on the west side of the Rappahannock River, and Hooker sent Sedgwick to force a passage of the river below Fredericksburg and turn the right wing of the enemy, while he himself, with 45,000 men, crossed the river above Lee's works. The plan was successful and before Lee knew it Hooker had taken up a strong position at Chancellorsville, a country tavern ten miles west of Fredericksburg. Then suddenly, despite his corps commanders, the Northern general changed his position to the Wilderness, a vast field covered with underbrush.

Little fighting was done the first day, but on May 2 "Stonewall" Jackson made a flanking march and, at six o'clock at night, surprised Howard, who imagined that the enemy was in retreat. In one hour the Federals were cut to pieces. At nightfall, after the battle, as Jackson rode out with his staff, he was mistaken for a Union horseman, was shot and mortally wounded by his own men. The following day Lee brought his command to aid Jackson's corps, whereupon Hooker became bewildered and, by holding back in action about 30,000 men, caused the demoralized Federals to be pressed back to the river. On May 4, while on the way from Fredericksburg, Sedgwick was met by 20,000 Confederates under Early, who forced him to recross the river. Two days later Hooker retired to his original position at Falmouth. All told, the Federals lost over 17,000 men; the Confederates about 12,000. The battle left Lee master of Virginia; but the victory was overshadowed by the loss of Jackson, who was one of the ablest Confederate generals.

Chan'cery. See COURT.

Channel Islands, a group of islands in the English Channel, situated off the west coast of Department La Manche in

France. Among the largest islands are Guernsey, Jersey, Alderney and Sark; the total area is 75 sq. m. They are a possession of Great Britain and have been heavily fortified, due to the strategic importance of their position. The fertile soil and mild climate are favorable for the production of abundant fruits and vegetables, which are largely used in the London markets. Population, about 96,000.

Chan'ning, William Ellery (1780-1842), a distinguished Unitarian clergyman and author, born in Newport, R. I. After graduating at Harvard he taught, then prepared for the ministry, being ordained, in 1803, as minister of the Federal Street Church in Boston. During the first few years of his ministry he did not emphasize his peculiar theological views, but in 1819 he preached a sermon which plainly showed his zeal for the doctrines of Unitarianism. Although he preferred to be known as an exponent of liberal theology within the Congregational body, still he became the real leader of the Unitarian movement which played so vital a part in the religious and literary history of New England. Harvard granted him the degree of doctor of divinity in 1821, in recognition of his able sermons and treatises; the following year he visited Europe, where he met Coleridge and Wordsworth. Aside from his influence as a religious teacher, he was a prominent figure in the social, philanthropic and educational movements of his time, being a zealous worker for the cause of anti-slavery, of temperance, of international peace and of purer politics. His writings include *Remarks on National Literature, Negro Slavery, Self-Culture* and numerous treatises and sermons.

Chanute, Cha noot', Kan., a city of Neosho Co., about 120 m. s.w. of Kansas City and 1 m. from the Neosho River, on the Atchison, Topeka & Santa Fe, the Missouri, Kansas & Texas and other railroads. Chanute is situated in the Kansas-Oklahoma oil and gas region, and the natural gas is utilized for lighting and for manufacturing purposes. A fine

farming and dairying district surrounds the city, and quantities of small fruit are grown. In addition to oil and gas, other natural resources are cement rock and brick shale, which occur in the vicinity. The manufactured articles include refined oil, Portland cement, asphalt, gas mantles, vitrified brick and tile, ice, flour, cigars and drilling tools. Chanute was formed by the consolidation in 1872 of four towns,—New Chicago, Alliance, Chicago Junction and Tioga—which had been settled about two years earlier. The present name was given in honor of Octave Chanute, a civil engineer and aeronautist. The place was incorporated as a city in 1873, and is now governed under a revised charter of 1888. Population in 1920, U. S. Census, 10,286.

Chapleau, Sha plo', Sir Joseph Adolphe (1840-1898), a Canadian politician, born at Ste. Thérèse de Blainville, Quebec. He studied at Terrebonne College and also at St. Hyacinthe, and began the practice of law in 1861. He was a member of the Quebec Legislature for Terrebonne and was solicitor-general, provincial secretary and minister of agriculture and public works. During the administration of Sir John Macdonald, Chapleau was a member of the cabinet as secretary of state. In 1892 he became minister of customs, and was later made lieutenant-governor of Quebec. He was a decided conservative in politics and made his appeals with a brilliant oratory scarce equaled among the French Canadians. He was professor of international law in the Montreal branch of Laval University for several years.

Chap'man, William (1850-), a Canadian poet, born in the Province of Quebec. Since 1902 he has served the Canadian Senate as a French translator, and engaged in journalism in Québec and in Montreal. His *Les Aspirations*, 1904, and his *Les Royons du Nord*, 1910, each received the highest prize of the French Academy. In 1907 he toured the western states lecturing on "The French Race in America."

Chapultepec, Cha pool"te pek', Battle of, the last serious engagement of the

Mexican War, fought Sept. 12 and 13, 1847, between about 4000 Mexicans, under Santa Anna, and 7500 Americans, under General Scott. General Pillow stormed the castle and captured about 1000 Mexicans, while later General Worth seized the main fortress of the city. With a large part of his army Santa Anna escaped on the night of Sept. 13, having previously freed from prison and armed some 2000 criminals. These assailed the Americans from the house-tops, but were soon routed, and on Sept. 14 Scott marched his victorious army into the Mexican capital.

Char'coal', a form of carbon produced by burning vegetable matter with an insufficient supply of air. When a fire is skillfully smothered, producing incomplete combustion, carbon is left behind in the form of charcoal. Wood charcoal is commercially produced by stacking upon end billets of wood to form a round conelike pile or pyramid, which is covered on the outside with sods, earth or clay to keep out the air. The fire is started at the tip of the cone and burns downward and outward. It is also made by burning wood in iron retorts. When properly burned, charcoal is of a deep black color, quite porous and brittle but without taste or color. Its porous texture makes it absorb air and gases, with which it parts upon being heated, and it is, therefore, used as a deodorizer. In the arts it is used as a fuel, and in southern Europe it is much esteemed for culinary and domestic purposes, owing to the intense heat it produces without smoke. It is employed, to some extent, in smelting ores. Formerly the best iron, known as charcoal iron, was produced by its use. Charcoal forms a part of gunpowder. In the form of lampblack it is the basis of many black paints. It is frequently employed to thicken printer's ink. See BONE BLACK; LAMPBLACK.

Charcoal, Animal. See BONE BLACK.

Char'iot, a two-wheeled vehicle used by all the great nations of antiquity in State processions and in war. The floor of the chariot rested directly upon the axle; the sides and front were about

four feet high; but there was no back seat or top. They were strongly and often elegantly built. In war, each chariot usually carried, besides the driver, one fighting man and his shield bearer. Attached to the sides of the Assyrian and Egyptian chariots were quivers of arrows. The war chariots of the Persians and Britons carried sharp, scythelike blades attached to the ends of the axle. Chariot races were common among the Greeks and Romans. A vivid description of these races is found in *Ben Hur*.

Char'ities, private or public organizations having for their purpose, without compensation, the relief of the poor, the sick and the insane and the care of children who have no means of support. Systematic relief of the poor dates from the early Christian Church, but it was a long time before the efforts of the Church were wisely directed, and the assistance rendered was as liable to injure as to help the recipient, because many were led to become professional beggars. The first real charitable institutions were hospitals, which in the beginning were supported by private contributions. The early attempt to regulate charities in England was in connection with the criminal law, which provided for the regulation and suppression of vagabonds instead of instituting measures for the relief of the poor. By the end of the 18th century there were many workhouses or almshouses throughout Europe supported by public funds. At the beginning of the 19th century the almshouse was practically the only public charitable institution in America. During that century great advance was made in the organization and administration of public charities. By the beginning of the 20th century practically every state in the United States had boards of charities whose duty it was to regulate all public and private institutions having care of the poor, the insane and the feeble-minded and those institutions having care of children.

In all large cities and many small ones there are charitable organizations under the direction of trained workers. The

cities are districted and each district is under the supervision of a skilled worker. The main purpose of organized charities is to encourage and aid the poor to become self-supporting and to prevent pauperism and crime among children and youth. In all needy cases relief is promptly provided. Through the influence of organized charities in these cities the laws governing child labor have been greatly modified and the work and influence of Juvenile Courts have been extended. See JUVENILE COURT; SOCIAL SETTLEMENTS; CHILD LABOR.

Char'ity, Sisters of. See MERCY, SISTERS OF.

Charlemagne, *Shahr' le mane*, or Charles the Great (742-814), King of the Franks and Emperor of Rome, the son of Pippin the Short and the grandson of Charles Martel. He became King of the Franks on the death of his father in 768 and began at once a career of wise statesmanship and judicious warfare which were to make his reign one of the most remarkable and his name one of the most prominent in history. His plan was not so much to enlarge his territory as to protect its borders from barbarism upon the north and west and from Mohammedanism on the south. To this end he made continuous warfare upon the Saxons, who threatened by their numbers to overrun the outlying territories. For 30 years he persisted in his efforts to civilize and christianize the foe that hindered the spread of Roman culture, until his victories became permanent. Similarly the Mohammedans were made to remain south of the Ebro in Spain and the Lombards were compelled to yield to the authority of the pope when Charlemagne deposed their king and himself assumed their iron crown. By these means Burgundians, Visigoths, Bavarians, Saxons and Franks were united in one vast kingdom in which the civilization of Europe was to develop.

At this time a woman, Irene, the mother of Constantine VI, had made herself the ruler of the East. This fact and the knowledge of the added authority that would be his led Charlemagne to re-

establish the Roman Empire in the West by being crowned Emperor of Rome by Pope Leo III in the year 800. This act added only to his dignity and not at all to his dominions, and his capital continued to be at Aachen (*Aix-la-Chapelle*). Though Charlemagne is now spoken of as the first Emperor of the reestablished Empire of the West, he was then considered the ruler of an undivided Roman realm, and it was not until later that the real division was recognized and the Western kingdom became known as the Holy Roman Empire.

The influence of Charlemagne is not to be estimated. He encouraged learning by his own love for study and for literature and by bringing the scholar Alcuin to his capital to found a school; he advanced agriculture and interested himself personally in the varied pursuits of his domain; he continued the authority of the counts, established by his father, but kept them in close surveillance by means of the *missi dominici*, or ambassadors sent to investigate their work; lastly, he consulted with his people by means of the general assemblies, or *may-fields*, held every spring and autumn.

Charlemagne was thoroughly a Teuton, tall, fair, energetic and interested in outdoor occupations. He was simple and temperate in his habits, fond of the old customs of his race but keenly alive to the benefits of Roman culture. After his death he became the hero of many legends that have added to his fame and show the veneration in which he was regarded by his people.

Charleroi, *Shahr'le roy'*, Pa., a city of Washington Co., 40 m. s.e. of Pittsburgh, on the Pennsylvania Railroad and on the Monongahela River. It is an important mining and manufacturing center, with extensive plate-glass factories, bottle works and coaling industries. The town was settled in 1890 and incorporated the following year. Natural gas is found in the vicinity. Population in 1920, U. S. Census, 11,516.

Charles, the name of ten kings of France, the first of whom was the Roman

Emperor Charlemagne. See CHARLEMAGNE.

CHARLES VI (1368-1422) became the king in 1380 and at first ruled under the guardianship of four uncles, whose personal ambitions brought about civil strife. When he assumed authority, Charles ruled wisely, but he became insane, and, during the unfortunate years that followed, Henry V of England, through the victory of Agincourt in 1415, gained control of much of France and even persuaded Charles to disinherit his own son by appointing Henry V successor to the French crown.

CHARLES VII (1403-1461) became king in 1422, though his kingdom was a divided one. Internal dissensions were rife and at first Charles failed not only to regain his possessions from the English but even lost new ones. The brilliant campaign, which finally returned France to French control, was due to the extraordinary figure of the age, the Maid of Orleans, Joan of Arc. Charles was consecrated at Rheims in 1429 and entered Paris in 1436. He gave the final years of his reign to the reorganization of his government, finances and army.

CHARLES IX (1550-1574) was the third son of Henry II and Catherine de' Medici, and became king upon the death of his brother, Francis II (1560). His training scarcely fitted him for the duties of his office, and his mother, who was regent during his minority, was the real power. It was she who forced his consent to the massacre of St. Bartholomew's Day (1572). Personally Charles seems to have been agreeable and entertaining, but the dissensions of the times and his inability to cope with them left him prematurely old.

Charles I (1839-), King of Roumania, son of Prince Karl Anton of Hohenzollern-Sigmaringen. When Alexander John was dethroned in 1866, Charles was elected Prince of Roumania. As a consequence of Roumania's vigorous action under his leadership in the Russo-Turkish War in 1877, when she declared her independence, she was recognized by several European powers, and, in 1881,

when she assumed the title of kingdom, Charles was crowned king. Under him the country has developed internally and has survived the difficult political situation in southeastern Europe. His wife, Queen Elizabeth, writes under the famous pen name Carmen Sylva.

Charles I (1600-1649), King of England, Scotland and Ireland, second son of James I. He married a Roman Catholic, Henrietta Maria of France, which greatly displeased the nation, and in 1625 succeeded to his father's throne. In further disregard of public opinion, he made his father's favorite, the Duke of Buckingham, his prime minister. The first Parliament which he assembled very sparingly granted subsidies; that of 1625 resolved to impeach Buckingham, whereupon the King imprisoned the Parliamentary leaders, Eliot and Digges, and resorted to ship money; that is, he extended a tax properly levied on seaboard towns and counties to inland districts. The Parliament of 1628 then presented the famous *Petition of Right*. Having dissolved three Parliaments, Charles determined to reign alone. This he did for 11 years, having Laud and Strafford for his advisers, and obtaining the semblance of sanction for some of his deeds through the arbitrary courts of High Commission and Star Chamber. Meanwhile republican principles were being developed and extended. In 1638 Scotland resisted the Anglican liturgy, which Charles there attempted to introduce, and the famous *Covenant* was subscribed in opposition to the King's plan. Moreover, Charles having collected an army to reduce Scotland, the Scotch Covenanters marched to the English border, where they defeated the royal army, and in 1640, for the purpose of securing funds to suppress the insurrection, the King again summoned Parliament. This became the famous Long Parliament. With it Charles disagreed, for, though he acceded to its first demands, in 1642 he accused five members of high treason. Parliament, however, supported these members and Charles fled from London. Civil war was thus precipitated, the bulk of the

gentry siding with the King, while the Puritans and inhabitants of the large trading towns supported Parliament. After fighting with varying success, the hopes of the Royalists were completely shattered at Naseby, June, 1645. The following year Charles surrendered himself to the Scottish army, which gave him over to Parliament, and, negotiations proving fruitless, he was tried and condemned to death as a tyrant. On Jan. 30, 1649, he was beheaded.

Charles II (1630-1685), King of England, Scotland and Ireland, eldest son of Charles I and of Henrietta Maria. During the Civil War he went with his mother to France, and he was at The Hague at the time of his father's execution. Immediately he took the title of King of England, and while he was contemplating an expedition into Ireland to assert his claim, the Scots offered him their crown. The following year, early in 1651, he was crowned at Scone. Chafing under the limitations under which he had received the crown, as well as under Presbyterian restraint, he soon headed the Scottish army, in the hope of winning the English Royalists to his support. However, in September, he was totally defeated by Cromwell, at Worcester, and fled to France, whence he went to Cologne and later to Netherlands. On the death of Cromwell the House of Stuart was restored, and on May 26, 1660, Charles landed at Dover amid acclamations of the people. Given almost all prerogatives, he made Clarendon his chancellor, brought to the scaffold those connected with the death of his father and restored the Episcopacy. His extravagance soon caused him to need money, so he married Catherine of Portugal for her large dowry. During his reign the infamous Cabal, a group of ministers favoring absolutism, came into power, the Triple Alliance was entered into, the Popish Plot was instigated, the Habeas Corpus Act was enacted and the Rye-House Plot was discovered. Charles had become more absolute than any of his predecessors, but he was beginning to realize the necessity of a more liberal

policy, when he suddenly died. Many of the events of his reign of which he himself was the cause, were blots on his country, and the dissoluteness of his life is probably without parallel in British history. However, his affability won him many friends.

Charles V (1500-1558), Emperor of the Holy Roman Empire and King of Spain (as Charles I), born at Ghent. He was the grandson of Ferdinand and Isabella of Spain and of the Emperor Maximilian. The heir of four great royal lines,—Austria, Burgundy, Castile and Aragon,—he inherited all these crowns before he was 19. In addition, he was made Holy Roman emperor in 1519, upon the death of Maximilian. Upon his accession to the imperial throne, Charles was confronted with a quarrel with Francis I of France, the threatened invasion of the Turks, and the disturbances due to the Protestant Reformation. Except for the trial and condemnation of Luther at the Diet of Worms in 1521, he was forced to turn his attention for a period of 25 years from the Reformation heresy to the administration of his Spanish kingdom and to the contest with France and Turkey. In 1525 he defeated Francis, took him prisoner and forced him to accept a humiliating treaty. The Pope having allied himself with Francis, an imperial army sacked Rome and took the Pope prisoner. By the Peace of Cambrai, 1529, Charles received Italy and gave up Flanders and Artois. In 1532 he marched against the invading Turks and forced them back down the Danube. In 1538 the exhausted rivals, Charles and Francis, agreed to a ten years' truce. But war again broke out, and when Charles had come within two days' march of Paris, Francis agreed to the Treaty of Crespy (1544), by which he gave up all claim to Italy and promised to aid Charles against the Turks and the Lutheran princes.

While Charles was engaged with these affairs, the Protestant princes had banded themselves together in the League of Schmalkald. At first victorious in his contest with these princes for the sup-

pression of heresy, Charles was finally forced to sign the Treaty of Passau, granting religious liberty to each state; and three years later by the Peace of Augsburg, he was obliged to legally recognize the Protestants. Foiled also in his other cherished project of seeing his son succeed him as emperor, and broken in health, he abdicated in 1556 in favor of his son as King of Spain and of his brother as emperor, and retired to the Monastery of Yuste, where he spent the remainder of his life in seclusion. While not a man of independent creative genius, Charles V had cool judgment and good sense and was the most influential ruler of his time.

Charles VI (1685-1740), a Holy Roman emperor of the Hapsburg line. He claimed the throne of Spain upon the death of Charles II, but was opposed by Philip of Anjou. The resulting conflict was the War of the Spanish Succession, in which Charles had the aid of England and Holland and was by them recognized as Charles III of Spain. The death of his brother, Emperor Joseph I, recalled him to Germany and he became emperor in 1711. His reign is marked by several successful wars, one of which resulted in the Quadruple Alliance, a union of the Holy Roman Empire, France, England and Holland against Spain. The closing years of his reign were occupied with efforts to secure the succession of his daughter, Maria Theresa, to the throne.

Charles XII (1682-1718), King of Sweden. His father died in 1697 and he was declared of age to rule. Sweden had aroused the jealousy of her neighbors, and Frederick IV of Denmark, Augustus II of Poland and Peter the Great of Russia leagued themselves against the young ruler. Charles first overcame the Danes and then defeated 50,000 Russians at Narva in 1700. He then dethroned August II and made a candidate of his own choice King of Poland. In 1707 he renewed the war with Russia and won the Battle of Smolensk. The next spring he laid siege to Poltava, but was defeated by the Rus-

sians after a fierce struggle. He then fled over the Turkish border to Bender, with only a few attendants. Charles was at first received with favor by the Sultan. However, the Turks soon began to suspect him and he was imprisoned, but he escaped and reached his own country in 1714. He was engaged in more mad schemes for conquest when he was killed in 1718 by a musket shot from the fortress of Frederikshald.

Charles XIV. See BERNADOTTE, JEAN BAPTISTE JULES.

Charles Edward, or Charles Edward Stuart (1720-1788), known as the Young Pretender. He was the youngest son of James Edward, the Old Pretender, and was encouraged by France to assert his claim to the British throne. Though aided by Lord George Murray, a skillful general, he was finally overwhelmingly defeated at Culloden Moor in 1746. Charles remained concealed by his devoted followers until, after many narrow escapes, he reached France. Though he later attempted many times to gain a following sufficient to warrant an uprising, he was unsuccessful, and after years of dissipation he died in Rome, the city of his birth.

Charles Martel' (about 688-741), a Frankish ruler whose title was Mayor of the Palace. He gained control of Austrasia and Neustria, besides several other provinces. He is chiefly noted for gaining the Battle of Tours in 732 against the Arabian Mohammedans of Spain. It was here that he gained the title Martel, or the Hammer. His custom of giving away Church lands hastened the development of the feudal system, as the feudal fief began with the ecclesiastical benefice. Pope Gregory III sought alliance with Charles, which marks the beginning of the later policy of the popes. Charles divided the country between his sons, Carloman and Pippin, in 741, and died soon after.

Charles the Bold (1433-1477), Duke of Burgundy, son of Philip the Good. He was opposed to Louis XI whose nominal vassal he was, and dreamed of creating an independent kingdom be-

tween Germany and France by adding Switzerland and other provinces to his territory. In 1476 he twice invaded Switzerland, but was defeated. His death ended the long resistance of the great French vassals to the power of the centralized monarchy.

Charles's Law. See GASES, LAWS OF.

Charleston, S. C., a port of entry, largest city of the state and county seat of Charleston Co., on a peninsula between the navigable Cooper River on the east and the Ashley River on the west, 82 m. n. of Savannah (Ga.) and 130 m. s.e. of Columbia, the capital of the state, on the Atlantic Coast Line, the Seaboard Air Line and the Southern Railway systems. A number of steamboat lines connect the city with New York, Philadelphia, Boston and Jacksonville and intermediate ports. There are freight boat lines to the West Indies, Central America and other foreign countries, carrying a large amount of freight and making Charleston an important distributing point of the Southern states. The Cooper and Ashley rivers unite below the city, forming a splendid harbor communicating with the Atlantic Ocean seven miles distant. The Federal Government deepened the entrance to the harbor in 1878, which resulted in greatly increasing the commerce of the city. Famous Ft. Sumter, situated on an island in the middle of the harbor, and historic Ft. Moultrie, on Sullivan's Island, defend the harbor entrance. A United States quarantine station is located on Ft. Johnson, and a United States navy yard on Cooper River, seven miles from the city. There is an excellent street-car system having many miles of trackage within the city limits and connecting with the Isle of Palms, a seaside resort ten miles north of the harbor. There is suburban service to Mt. Pleasant, Magnolia Gardens and Summerville, a health resort in the pinelands. Magnolia cemetery is the principal burial place of the city. Charleston is the chief commercial city of the state and has varied industrial interests.

PARKS AND BOULEVARDS. The city has about nine miles of water front and

covers an area of nearly five square miles. The city proper is laid out at right angles. King Street is the principal retail thoroughfare. Rutledge and Ashley avenues and Meeting Street run north and south the entire length of the city. Charleston has wide and well-paved streets bordered with live oaks, linden and other beautiful shade trees. The city retains many of the landmarks and characteristics of the cities of the South in its architecture. There are many stately residences surrounded by gardens containing azaleas, jessamines, magnolias, camellias and other flowers, throughout the year. The largest park in the city is Hampton Park, named in honor of Gen. Wade Hampton. White Point Garden is a handsome wooded park containing monuments to Sergeant John Jasper and William Gilmore Simms. The Battery, a broad esplanade, commands a magnificent view of the harbor. A number of small city squares and gardens are in different portions of the city. Marion Square contains a monument to the memory of John C. Calhoun, and Washington Square contains a statue of William Pitt and monuments to Timrod and Beauregard.

PUBLIC BUILDINGS. The noteworthy buildings include the custom-house, city hall, courthouse, a library, arsenal, Federal Building costing \$500,000, the Colonial Exchange, a museum, a number of banks, substantial business blocks and about 60 churches, which include St. Michael's (Episcopal), dating from 1761 and having fine chimes, and St. John's Cathedral. The city is also the seat of a Catholic see.

INSTITUTIONS. The chief educational institution is Charleston College, opened in 1790. Other educational institutions include the South Carolina Military Academy, Memminger High and Normal schools, the Porter Military Academy, South Carolina State Medical College, Lady of Mercy Academy, a school for young ladies, several private schools, and the Avery Normal Institute and the Wallingford Academy for colored students. Among the benevolent and char-

itable institutions are the Orphan House, founded in 1792, Euston Home for the aged, home for widows of Confederate soldiers and the Roper Hospital.

INDUSTRIES. The most valuable staple is sea-island cotton, which grows abundantly on islands near the city. The city's commerce consists largely in the export of rice, cotton, fruits, lumber, naval stores and fertilizers. The preparation of fertilizers from the extensive beds of phosphate rock along the Ashley River, and cotton compressing form the chief industries of the city. There are manufactories of cottonseed oil, cotton goods, cigars, machinery, furniture, flour and other products, and there is a large wholesale trade in dry goods and drugs. Large quantities of vegetables and fruits grown in the vicinity are shipped to Northern markets.

HISTORY. The first settlement was made in 1670 by an English colony and the place named in honor of Charles II. The population was increased in 1685 by Huguenot refugees. Charleston was incorporated in 1783 and until 1790 was the capital of the state. On Apr. 12-13, 1861, the Confederates bombarded and captured Ft. Sumter, which marked the beginning of the Civil War. The city suffered severely from an earthquake on Aug. 31, 1886, but the damages were quickly repaired. An Interstate and West Indian Exposition was held here in 1901-02. Population in 1920, 67,957.

Charleston, W. Va., the capital of West Virginia and the county seat of Kanawha Co., about 388 m. s.w. of Washington, D. C., at the confluence of the Great Kanawha and Elk rivers, and on the Chesapeake & Ohio, the Coal & Coke, the Kanawha & Michigan, the Virginian, the Kanawha & West Virginia and other railroads. The city is connected with other ports of the Ohio and Mississippi rivers by steamboat service, and ships large quantities of coal and timber. Natural gas, iron, oil, salt, coal and lumber are among the resources of the section in which it is situated. The manufactures include furniture, carriages, lumber, glass, fire engines, iron,

boilers, wire nails, axes, foundry and machine-shop products, woolen goods, mechanics' tools and fire brick. There are boat-building yards, railroad repair shops and color and veneer works in the city.

Charleston occupies an attractive site on level ground above the rivers, which meet here, and has, in addition to the state capitol, erected in 1880, a fine customs-house costing \$300,000, courthouse and high-school building. It has two large libraries—the state law library and the library of the West Virginia Department of Archives and History. The site of the town was first occupied by white settlers in 1786, and streams of immigrants to the Ohio Valley passed through it, stimulating a busy trade. The place was incorporated in 1794. In 1870 it was chartered as a city, in the latter year becoming the seat of government; and it has remained the capital ever since, except for the ten years following 1875, during which Wheeling was the capital. Population in 1920, U. S. Census, 39,608.

Charlotte, *Shahr' lot*, N. C., largest city of the state and county seat of Mecklenburg Co., 175 m. s.w. of Raleigh and 267 m. n.e. of Atlanta, on the Seaboard Air Line, the main line of the Southern and other railroads. Charlotte is the center of the cotton-mill industry of the South, within a radius of 150 miles are 770 cotton mills. The city has an elevation of 760 ft. above sea level and covers an area of 13 sq. m. There are about 30 m. of electric railway lines throughout the city and near-by suburbs, which include Piedmont, Hill Crest, Willmore, Colonial Heights, Villa Heights, Highland Park, Sunnyside and Dilworth.

PARKS AND BOULEVARDS. The streets of the city are broad, well kept and shaded, and there are many attractive residences. The system of graded and macadamized roads that has since been generally adopted all over the country originated in Mecklenburg County, which is the center of the famous Piedmont region. Among the city parks are Latta, Electric and Lakewood parks. Lake-

wood Park is the largest and contains a large artificial lake. There is a fine country club and golf course.

PUBLIC BUILDINGS. The noteworthy buildings include the county courthouse, Federal Building, assay office, a Carnegie library, seven banks, the Realty, the Commercial and American Trust buildings, a Y. M. C. A. costing \$175,000 and an auditorium. The Selwyn, the Stonewall, the Central, the Buford, the Leland, the Clayton and the Queen City are among the elegantly-equipped hotels. There are about 62 churches.

INSTITUTIONS. Charlotte is one of the greatest educational centers in the South. Elizabeth College and Conservatory of Music is a high-grade college for young women. The Presbyterian College is a new well-equipped college of strikingly handsome architecture. The North Carolina Medical College is located here, and there are two private schools for boys, an industrial training school, a business college and 16 graded schools. Biddle University (colored) is located on the outskirts of the city. Other institutions include the Charlotte Sanatorium, the Presbyterian, St. Peter's, Mercy General and Good Samaritan hospitals, the last named being for colored people.

INDUSTRIES. The city is the center of greatly developed electrical power. The total horsepower, developed and in immediate process of development, being nearly six-hundred thousand, the country adjacent to Charlotte is rich in mineral wealth and is the center of the Southern Appalachian gold fields. The city contains extensive iron works, cottonseed oil mills and manufactories of farm implements, clothing, monumental works, cotton gins, elevators, fertilizers, mattresses, automobile tires, etc., there are about 200 widely diversified manufacturing and industrial plants in the city. It also is the largest distributing center for textile mills machinery in the South.

HISTORY. The first settlement was made about 1750 and the place named in honor of Princess Charlotte of Mecklenburg-Strelitz. The Mecklenburg Declaration of Independence is said to have

been signed here in May, 1775. A city charter was granted in 1866 and a re-charter given in 1907. For the last few years Charlotte has been one of the rapidly growing cities of the South. Population in 1920, U. S. Census, 46,338.

Charlottenburg, *Shahr lot' en boork*, a town of Prussia, forming a suburb of Berlin, situated on the River Spree. An elevated road, the Stadtbahn, and a street railway connect it with Berlin. The educational institutions, including several technical schools, are important; among the significant manufactories are the famous Royal Porcelain Factory (founded in 1761), iron foundries and factories for the production of glass, pottery, machinery, leather, chemicals, paper and electrical apparatus. A castle was erected for Queen Charlotte by Frederick I in 1699, and from this the town derives its name. The city as such was founded by Frederick I in 1705 and has enjoyed a rapid growth since the Franco-German War. Population, about 305,978.

Char'lottetown, a city of Canada, the capital of Prince Edward Island, situated on Hillsborough River. The harbor is excellent and the river is navigable for several miles. Regular communication by steamer with the principal Canadian and American ports is maintained. Among the public buildings are the Provincial Government and Dominion buildings, St. Dunstan's College, Prince of Wales College and an asylum for the insane. One of the largest pork-packing plants of the Dominion is located here as well as the workshops and head office of the Prince Edward Island Railway. Manufactures are woolen goods, lumber, iron, canned goods and wagons. The town was founded in 1750 as Port la Joie, but under British rule the name was changed to honor the Queen of George III. Population about 14,000.

Charon, *Ka'ron*, son of Erebus and Nox, ferried souls across the Styx to the lower regions. From the dead his fee was a bit of money, which he found under the tongue; from the living he required the evidence of a golden bough, obtained from the Cumæan Sibyl.

Charon was represented as a hearty old man with flaming eyes and bushy white hair, wearing a dingy, mud-stained garment. He carried a pole for directing his boat.

Chart, a term often used somewhat loosely to designate a graphic representation, but most properly applied to the marine or nautical charts prepared for the guidance of navigators. These show the points of the compass, the latitude and the longitude, coasts, islands, rocks and banks, the channels or entrances to harbors, rivers and bays, the depth of water as proven by repeated soundings, the character of the bottom and prevailing currents, also the constantly changing aids to navigation, such as lighthouses, buoys, etc., and the proper courses for entering or leaving important ports. About 800 charts have been prepared by the United States Coast Survey, and some 1500 by the hydrographic office of the navy. They are sold at very low prices. The British Admiralty charts are also of special value. See COAST AND GEODETIC SURVEY, UNITED STATES.

Charter. In general significance a charter is a government permit in writing, extending over a period of years, under which a corporation may engage in a specified business under official oversight, and may be granted by special legislative act. Every charter states the legal name of the company, the amount of capital stock, the number of shares and par value of each, and provides for reports to the authorities of the state by which any violation of charter privileges may be discovered. In former times the name was given to formal deeds by which sovereigns granted certain governmental powers to the people in their colonies, and such charters the towns zealously guarded as the "title deeds of their liberties," as was the case of the colonies in America previous to the Revolutionary War. Some of these charters formed the basis of the constitutions of the respective states.

Charter Oak, a famous oak tree which formerly stood on the northern slope of the Wyllys Hill, in Hartford,

Conn. The trunk was 25 ft. in circumference near the roots. In 1687 Sir Edmund Andros, then governor-general of New England, demanded at Hartford the release of the charter, and to this outrage the colonists feigned to submit. However, when the deed was to be consummated, lights in the council chamber were suddenly blown out, and in the confusion which followed, the charter was spirited away. Tradition says that it was concealed in a large cavity, about two feet from the ground, in the trunk of Charter Oak, where it remained from the summer of 1687 until the spring of 1689, when Andros was deposed. Other versions of this story make the tree to have been an elm, or the hiding place of the charter to have been the home of a prominent citizen. However this may be, from 1789, when the legend of Charter Oak became generally accepted as a truth, until 1856 the tree was revered. On Aug. 21 of that year it was blown down by a heavy gale, and a white marble slab now marks the exact spot where it stood.

Charybdis, *Ka rib' dis*, a whirlpool in the Straits of Messina, considered especially dangerous by the ancients. Opposite it were the cliffs inhabited by Scylla, a monster with six heads on long necks. It was her custom to snatch, with each head, a sailor from passing boats. In trying to avoid one peril, vessels usually met with disaster from the other.

Chase, **Salmon Portland** (1808-1873) a chief justice of the United States, born in Cornish, N. H. He graduated from Dartmouth College in 1826, taught school and studied law, was admitted to the bar in 1830 and began practice in Cincinnati, where he soon acquired a large clientele. From 1849 to 1855 he was United States senator, and vigorously opposed the extension of slavery. As a lawyer he had defended so many slaves that he was called by Kentuckians the "attorney-general for runaway negroes." He served as governor of Ohio for two terms beginning in 1855. In the Republican convention of 1860 he was a prominent candidate for the presidential nomination.

He was appointed secretary of the treasury by President Lincoln in 1861, rendering a great service to the nation during the next three years in financing the government and providing the "sinews of war." In 1864 he resigned and was appointed chief justice of the Supreme Court, in which capacity he presided with marked ability and fairness at the impeachment trial of President Johnson.

Chase, William Merritt (1849-1916), a distinguished American artist, born in Franklin, Ind. After considerable European study he returned to New York in 1878 and soon attained international celebrity. He is one of the most brilliant technicians of the American School, executing with equal facility portraits, figures and still life. Among his portraits are those of numerous American and English notables. Particularly successful with women's figures, his portraits of Mrs. Chase and Mrs. Theodore Roosevelt are among his most satisfactory portraits; also that entitled *Alice* (Art Institute, Chicago), one of the most sprightly, lithe and graceful little figures American art has produced. Also noteworthy are *Ready for the Ride* (Union League Club, New York), *Lady in Black* (Metropolitan Museum, New York), *Master Otis Barton and His Grandfather* and *Mr. Steichen*.

Chat, a bird of the Wood Warbler Family. The yellow-breasted chat, or polyglot chat, as it is frequently called, on account of its peculiar song of whistles, chuckles, wails and clucks all mixed up in a jumble, may be known by its bright yellow breast and throat, white under parts, greenish-brown back, and the white line over the eye as well as about the eyelids. It is somewhat larger than the English sparrow. Its performances in the air are peculiar, its flight at times greatly resembling that of a huge moth. The nest is large and compact, built of leaves, grass and strips of bark, with a lining of grass. It is placed in the crotch of a small shrub four or five feet from the ground, and contains three to five white eggs spotted with brown. The chat spends the summer in the

Southern, Middle and Eastern states, and winters in southern Mexico and Central America.

Chateaubriand, Sha"to"bre"ahn', François René Auguste, VICOMTE DE (1768-1848), a French author and statesman, born in the Catholic province, Saint-Malo. The influences in his early life which caused his thoughts to be directed toward mystical and religious channels were his mother's piety, the quiet reserve of his father and the Breton legends on which his childish fancies fed. In 1790 he obtained a government commission to seek the Northwest Passage to India, and this gave him opportunity to visit America; the open prairies, the Great Lakes and semitropical Florida, together with the Indians, the "children of nature," made a strong appeal to him, and their influence on him is revealed in much of his later work. On his return to France he served in the army, although the excesses of the Revolution had greatly modified his zeal for reform in the political world. In 1793 he went to England and supported himself with literary work. He held diplomatic positions under Napoleon and under the Bourbons after their restoration, which cause he had aided.

His first great literary success, *Atala*, appeared in 1801, and because of its marked beauty and romantic idealism was received with popular acclaim throughout France. He was among the first to make use of the literary material offered by Christian antiquity and the Middle Ages, and founded a new descriptive school of personification and idealization of nature. *The Genius of Christianity* was a brilliant plea, but it suggested that he was interested in finding Christianity beautiful, poetic and pathetic, rather than true. His ideal was to make literature Christian and national, and though his influence was often morbid rather than permanent and was the germ of the introspective pessimism that was soon to become a characteristic of the age, he marks a distinct and important era in literary art. Among his other works are *René*, *Les*

Natches, The Martyrs, Bonaparte and the Bourbons and his Autobiography.

Chatham, Chat'am, a city of Canada in the Province of Ontario, situated on the Thames River, 45 m. n.e. of Detroit and on the Canadian National the Wabash and Père Marquette railways. Its leading manufactures are autos and auto trucks, bricks, tile, and iron and cement goods. The extensive grain supply of the fertile agricultural region which surrounds the town is shipped via lakes Erie and Ontario. Population, 15,000.

Chat'tahoo'chee River, a river of southern United States, rising in north-eastern Georgia and flowing southwest to the city of Westpoint on the boundary between Georgia and Alabama; at the northern boundary of Florida it unites with the Flint River and the two flow into the Gulf of Mexico under the name Apalachicola. The Chattahoochee is 500 m. long and is navigable for small steamboats for 360 m. from the Gulf. The cities of Columbus and Atlanta lie upon its banks.

Chattanooga, Tenn., a city and county seat of Hamilton Co., 300 m. s. of Cincinnati (Ohio), on the Tennessee River and on the Cincinnati, New Orleans & Texas Pacific, the Alabama Great Southern (known as the Queen & Crescent), the Nashville, Chattanooga & St. Louis, the Central of Georgia, the Chattanooga Southern, the Western & Atlantic and other railroads. Lines of steamers ply the Tennessee River, which is navigable to this point during the greater portion of the year. The city has an average temperature the year round of 60° and is a natural health resort by reason of its 700 ft. elevation and the mineral springs which abound. Chattanooga is situated in the heart of the coal region of the South and has vast supplies of timber. Iron ore, limestone, clay, bauxite and other minerals are found in abundance, and the city possesses every advantage for the successful operation of textile industries. The city is well known as a jobbing center, and the adjoining districts are adapted to truck gardening and dairying. There is an ex-

cellent street-car system of about 75 m. reaching out to the suburban districts. Vast power plants have been erected on the Ocoee and Tennessee rivers, which supply electric power for the industrial interests of the city.

PARKS AND BOULEVARDS. Lookout Mountain, famous in history, stands 1700 ft. above the city. The summit is reached by incline and trolley railroads from St. Elmo, the city's nearest suburb. Broad boulevards traverse the mountain plateau. At the Point of Lookout Mountain, a view of seven states may be obtained. The Point is the location of a government park. The beautiful entrance to this park was erected of mountain sandstone by the United States at a cost of \$20,000. Here, too, is the \$125,000 New York State Peace Monument, erected as a memorial to those who fought in the Chattanooga campaign. The Federal Government has purchased the entire Chickamauga battlefield, embracing 15 sq. m., and converted it into a magnificent park. This park is connected by an electric street-car line with the city. The various states have each expended large amounts in the erection of monuments to perpetuate the deeds of their soldiers. Ft. Oglethorpe military post, now designated as a brigade post, is one of the newest and most complete in the country, and three regiments of cavalry are permanently stationed here. About 100 m. of boulevard extend through the park and along the crest of Missionary Ridge. The streets of Chattanooga are broad, well paved and attractively shaded, and there are many palatial residences. East of the city is a national cemetery containing the graves of about 13,000 Federal soldiers.

PUBLIC BUILDINGS. The noteworthy buildings include the new county courthouse, a terminal station, which cost \$1,000,000, the Federal Building, Y. M. C. A. and Y. W. C. A. buildings, Masonic Temple, city hall, the Mountain City, Elks and Commercial club buildings, a Carnegie library, about ten banks, the James, Temple Court and Hamilton National Bank buildings, an armory, the

Memorial Auditorium, about 14 hotels, including the Patten, which cost \$1,000,000, a number of theaters, substantial business blocks and about 120 churches. Among the newest church structures are the First Presbyterian costing \$150,000, and the new Centenary Methodist Church costing \$200,000.

INSTITUTIONS. The leading educational institution is the University of Chattanooga, which is heavily endowed, the buildings and grounds being valued at \$400,000. Other institutions include the Chattanooga College of Law, a number of preparatory schools, 3 high schools, 2 junior high schools, 19 grammar schools. Charitable institutions are Erlanger Hospital and a tubercular Sanatorium.

INDUSTRIES. More pig iron is smelted in Chattanooga plants than in those of any southern city. There are also car shops, flour mills, foundries and machine shops, tanneries, agricultural-implement works, woodworking plants, planing mills, glass factories and manufacturing of talc and clay products, cotton and woolen yarn, hosiery, confectionery, medicines, food products, elevators, acetylene machines, boilers, tanks, metal ceilings, hardware specialties, furniture, cigars, cottonseed oil, brass and optical goods and other diversified products, numbering in all over 300 factories and making 1000 different articles.

HISTORY. Chattanooga was first settled about 1830 and known as Ross's Landing, being named from John Ross, a Cherokee chief. The place was incorporated in 1840 and the name changed to Chattanooga. During the Civil War it was one of the most important strategic points, and renowned battles were fought in the vicinity. A city charter was granted in 1866. Population in 1920, U. S. Census, 57,895.

Chat'tanoo'ga, Battle of, one of the most important engagements of the Civil War, fought near Chattanooga, Tenn., Nov. 23 to 25, 1863, between 80,000 Federals under the supreme command of Grant, and 53,000 Confederates under Bragg. It comprises three separate battles, each of great importance,—Chick-

amauga, Lookout Mountain and Missionary Ridge. (See the first two under their titles.) Missionary Ridge was the concluding and decisive battle of the series. It is divided into two stages, fought November 24 and 25, and ended in a decisive victory for the union forces. Gen. Sherman and Gen. Thomas were the union commanders. The national cemetery at Chickamauga commemorates these battles.

Chateau Thierry, Battle of. One of the important battles of the World War, fought near the city of Chateau Thierry on the Marne River about fifty miles northeast of Paris, France. This battle possesses a peculiar interest for Americans since it was the first important battle in which American forces were engaged, and the victory there won was not only of great importance in itself, but it came at the right psychological moment and its effect on that subtle force—the morale of an army—exceeded in value the immediate results of the victory itself.

Chateau Thierry marks the farthest point towards Paris, reached by the Germans, in their great offense of 1918. There, on the afternoon of July second, the seasoned veterans of the Army of the Crown Prince, hurrying towards Paris, were suddenly confronted by troops of the American Marine brigade there entering on their first battle. It proved to be one of the most sanguinary contests of the war; but when it ended the Germans were not simply held—they had been forced back and almost routed. Up and down the hundreds of miles of battle front was flashed news of this achievement and every Allied force felt a spirit of renewed confidence and cheer, that showed at once in the astonishing series of victories that soon followed.

Chat'tel, any property except real estate or the tenure to real estate. It is a broader term than goods or effects and includes chattels real and chattels personal. The former are money, plate, furniture, etc., or such as are movable; the latter are leases, mortgages, growing crops and similar forms of property.

Chat'terton, Thomas (1752-1770), an English poet, known as "the marvelous boy," born in Bristol. At the age of 16 he published the *Rowley Poems*, his own productions, claiming that they were the work of one Thomas Rowley, an imaginary monk of the 15th century. The forgery deceived his contemporaries—among them the wise Horace Walpole—and the indisputable merit of the poems was generally recognized, until some critic declared them modern, whereupon the boy's friends turned away from him in contempt. After serving aimlessly as clerk to an attorney he went to London. Failure and starvation stared him in the face at the end of two months. He retired to his miserable attic in despair, and drank poison, after destroying whatever poetry he had on hand. The brilliant imagination displayed in his work and the wonderful fertility of his mind mark him as an extraordinary prodigy in the history of letters. Best known are his *Tragedy Ælla*, *Ballade of Charitie*, *Battle of Hastings* and *Ode to Liberty*. He also contributed prose in the form of spirited satire to various London periodicals.

Chau'cer, Geoffrey, Jef' fry, (about 1340-1400), the first great English poet, born in London. His father was a wine merchant and was occasionally in the service of Edward III. When Chaucer was about 17 he became a page in the household of one of the royal family. Two years later he served in the army of Edward III, in France, was taken prisoner near the city of Rheims and subsequently ransomed by his royal master. On his return to England Chaucer became Squire of the King's Bedchamber; later he undertook several missions for Edward to different parts of Europe and received several official appointments. In 1386 he held a seat in Parliament, but, suffering a loss of offices during the reign of Richard II, he fell into poverty. A pension granted him in 1399 by Henry IV enabled him to spend the last year of his life in comfort. He was buried in that part of Westminster Abbey which is now the Poets' Corner.

Chaucer's work in literature is definitely connected with his experiences as a courtier, diplomat and office-holder. During the years of service at Edward's court, then greatly under the influence of French life and thought, he studied French literature, wrote a number of ballads and short poems in the French manner and made an English translation of *The Roman de la Rose*, a famous poem of the school of the trouvères. The most important work of this period is his *Book of the Duchesse*, written in 1369 on the death of the wife of John of Gaunt. In 1372 Chaucer made his first visit to Italy, then at the height of the intellectual activity of the Renaissance, and the effect of his contact with the splendor of this period is thereafter noticeable in his works. The most important result of this Italian influence is a long poem adapted from Boccaccio's *Il Filostrato*, entitled *Troilus and Criseyde*. The crowning work of Chaucer's life, however, was written in his later years, when his varied experiences with real men in everyday life had stored his mind with pictures of the actual world about him. His great masterpiece, the *Canterbury Tales*, is thoroughly English in spirit, though the plan was suggested by Boccaccio's *Decameron*.

Chaucer represents himself as stopping one evening in April at the Tabard Inn, in Southwark, a London suburb, and finding himself in the company of a group of Pilgrims, 29 in number, on their way to Canterbury to visit the shrine of the martyr Becket. At supper the innkeeper proposes that on the way to Canterbury each traveler tell two tales and on the homeward journey two additional ones. The one who has told the best story is to be feasted on their return, at the general expense. All approve and the next morning they start. Chaucer did not complete the entire list of stories, writing but 24. They are adaptations and borrowings from medieval literature, but always bear the stamp of the poet's individuality. The prologue is original in every sense of the word, and is unsurpassed in English literature in the humor

and fidelity of its character portrayal. The stories themselves are enlivened by bits of dialogue and action; Chaucer represents himself as being joked about his corpulency.

Chaucer wrote at a period when the English language had no standard literary form. He used the East-Midland dialect so effectively that the language of the *Canterbury Tales* became the model for the poets that followed him. Moreover his verse is so melodious and so perfectly adapted to whatever is his theme that he is not only the father of English poetry but the first writer of artistic English.

Chaudière, Sho'dyar', a Canadian river of the Province of Quebec, about 120 miles long, rising in Lake Megantic not far from the northwestern boundary of Maine and flowing north-northwest into the St. Lawrence, which it enters seven miles above the city of Quebec. Its banks are high and rocky, and numerous islands lie in its course. The Falls of the Chaudière near its mouth have a descent of 130 ft. They are noted for their beauty and are visited by many tourists.

Chautauqua, Sha tok'wa, Movement. This takes both its name and its character from an annual summer assembly, held regularly since 1874 on the beautiful shore of Lake Chautauqua in southwestern New York. The assembly of 1874 continued for only two weeks. It was arranged by Lewis Miller of Akron, Ohio, and Rev. John H. Vincent of New York. Two years later the session was lengthened to three weeks, and afterwards to 60 days. Well-known authors, scholars and public men from every part of America, and from other lands, are secured to address the assembly upon those topics concerning which they have first-hand or expert knowledge. From the beginning, instruction in the Bible, in teaching and in the organization and management of Bible schools formed a part of the plan. In 1879 courses of instruction in various other subjects were offered; and, little by little, these have been extended until now the Chautauqua Institution, reincorporated in 1902, main-

tains schools of English language and literature, of the modern and classical languages, of mathematics, science, pedagogy, library training, domestic science, physical education, expression, music and the arts. The regular instruction in these many fields, though given largely by college and university men of note, is supplemented by single lectures and short courses by the most eminent authorities. More than 2500 students are enrolled and many of these carry on their work by correspondence during the other months of the year.

In 1878 some 7000 persons were enrolled for the first course of the Chautauqua Literary and Scientific Circle. This provides carefully planned home reading throughout the year and for the regular discussion, in local circles of three or more persons, of topics covered. The *Chautauquan*, a magazine containing supplementary matter and suggestions helpful to the members, has contributed largely to the success of the home-study courses. During the first 20 years, 10,000 local circles were established and more than 250,000 members enrolled. Some 50,000 persons have pursued the entire four-year course, which includes the classical year, the modern European year, the English year and the American year. For their benefit, and for others, more than 75 special courses have now been developed, in each of which the student may receive by correspondence the assistance of college professors.

The direct benefits to thousands of those enrolled for the work at the Chautauqua Assembly, in its reading circle, or for that instruction by correspondence which it has developed, have been far-reaching and quite beyond comprehension. The indirect influence of the Chautauqua Movement, however, has perhaps been no less important. The success of the assembly at Lake Chautauqua has led to the opening of more than 300 similar assemblies throughout the United States and Canada. Its reading circle has become a model for various others. Correspondence courses have received the stamp of approval by such men as Wil-

CHECK

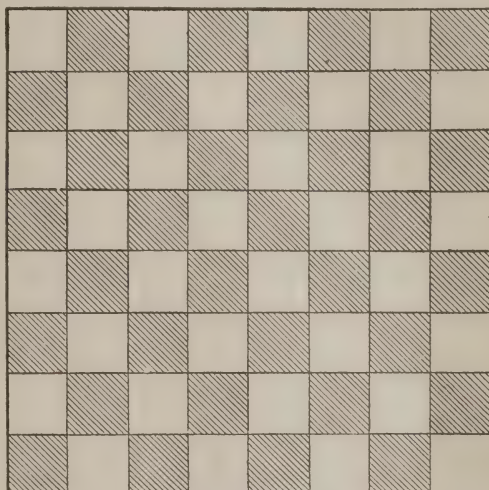
liam Rainey Harper, whose long experience in the work at Chautauqua led him to develop similar courses at the University of Chicago. See VINCENT, JOHN HEYL; VINCENT, GEORGE EDGAR; HARPER, WILLIAM RAINEY.

Check (cheque), a written order directing a bank or banker to pay the person designated therein or to his order, or to the bearer, a stipulated amount of money on demand; a bill of exchange drawn on a banker payable on demand. A check made payable to the bearer is transferable, and may be presented to the bank by any one without indorsement or identification. A check made payable to some definite person or to his order must be indorsed by that person; that is, his name must be written on the back of the check, before it can be transferred or the money received from the bank. In the latter case the bank must know that the party who receives the money is the one to whom it was made payable, or some one authorized by him to receive it; that is, the person receiving the money must be *identified*. Checks serve as one form of currency, and their use in the business world for the payment of bills and the transfer of funds is much more common and extensive than is the use of money. Checks are usually, but not necessarily, made out on printed forms. After they have been paid, they are canceled by the bank and charged to the account of the signer, to whom they are periodically returned. A check drawn by one bank upon another is called a *draft*. See DRAFT; BILL OF EXCHANGE; NEGOTIABLE PAPER.

Check'ers, a very ancient game of skill, no less popular today than among the Egyptians, Greeks, Romans or Chinese of long ago. It is played by two persons on a square board made up of 64 equal squares, of which 32, chosen alternately, must be colored. Unless both players agree, observers may not offer suggestions to either opponent. The players face each other, and each places his 12 disks, or men, in three rows of four each, on the uncolored squares nearest to him, that is, on squares 1—12,

CHEESE

and 21—32. These men are of uniform size and color and easily distinguishable from their opponents. They are commonly either black or white. Each player, in turn, moves one man forward diagonally to the right, or diagonally to the left, to the next uncolored square, as from 24 to 20 or from 24 to 19. But, if 19 is occupied by a Black, and 15 is unoccupied, the White on 24 must jump to 15. If White can then jump from 15 to 8, or 6, Black may not play until White has done this. The Blacks jumped will



CHECKERBOARD

then be removed from 19 and 11, or from 19 and 10; and only ten Blacks remain to oppose 12 Whites. Any White reaching the King row, squares 1, 2, 3 or 4, becomes a King. Any Black reaching squares 29, 30, 31 or 32 becomes a King. Men are made Kings by being crowned with a second disk. Kings may move backward or forward over the entire board; as, from 7 to 2, 3, 11 or 10. If all the Blacks are jumped, or forced into positions from which they cannot move, White wins. If both Whites and Blacks are so reduced in number that neither can overpower the other, it is a drawn game.

Cheese, a name applied to a number of varieties of dairy products made from the casein and butter fat of milk. If all of the cream is left in the milk, the cheese

is called full-cream cheese; if partly skimmed, the cheese is part-skim, or half-skim cheese; and if all skimmed, full-skim cheese. The latter is a hard, flavorless cheese which does not become palatable even when cured for months; in many states of the United States its manufacture is forbidden by law.

The two commonest kinds of cheese manufactured in the United States are Cheddar, or American, cheese, and cottage, or Dutch, cheese. The American cheese is made by adding rennet or a small amount of rennet extract to milk. The ferment contained in the rennet causes the milk to curdle and the "curds" thus formed are cut and carefully heated in vats. Here they contract and harden, after which the whey is strained off and the mass salted and pressed into shape for the market. Before being placed on sale, however, the cheeses are placed in curing cellars where they are kept at an even temperature from a month to a year; if sold before this, the cheese is neither so nutritious nor of so pleasing a flavor as otherwise. In the United States over 300,000,000 lb. of this kind of cheese are made annually, nearly 95 per cent of which is made in cheese factories. It requires one and three-eighths gallons of milk to make a pound of cheese.

Cottage cheese is made by allowing the milk to sour in the room at ordinary temperatures. The curd is cooked, strained from the whey and salted; it may be eaten without any curing and forms a pleasing addition to spring and summer table fare.

New York and Wisconsin are the chief cheese-making states. Europe produces more varieties of cheese than the United States, and Canada is the largest cheese-producing country of the world. The foreign cheeses most commonly used in the United States are: Roquefort cheese, a highly-flavored, blue-molded cheese made from ewe's milk and cured in caves at Roquefort, France; and Edam cheese, a yellow cheese first made at Edam, Holland, and sold in crimson-painted spheres of three or four pounds each.

Cheha'lis, Wash., a city and county

seat of Lewis Co., on the N. P., G. N., O. W. R. & N., and C. M. & St. P. railroads, midway between Seattle and Portland. The Union Pacific Railroad also traverses Lewis County. Lumbering, mining, dairying and fruit growing are the chief industries. The city contains well-paved streets, electric light and sewage systems, fine business blocks, good municipal buildings, banks and numerous churches. There is a large and growing trade. Chehalis has excellent public schools, and the Washington State Training School for Boys is located near the city. The industrial establishments include shingle and planing mills, "ready cut" house factories and other wood-working plants. Population in 1920, U. S. Census, 4,558.

Chelsea, *Chel'se*, Mass., a city of Suffolk Co., 2 m. from Boston, on the Boston & Maine and other railroads. It is connected with Charlestown by a bridge across the Mystic River, and with East Boston by two bridges across Chelsea Creek. There is also connection with Boston by ferry, steam and electric railroads. Electric lines connect the city with Lynn, Everett, Malden, Maplewood, Salem and other cities. Chelsea is attractively located on rising hills, has pleasant streets and is a suburban dwelling place for Boston business men. The natural feature of the landscape is Powderhorn Hill in the northern part of the city, which is over 200 ft. high.

Among the important buildings are the Soldiers' Home, the Federal Building, the Marine Hospital, the Naval Hospital, 3 Junior and a Senior High School, splendid elementary school, Chelsea Memorial Hospital and a Carnegie library. Within the limits of Chelsea are 21 acres of the Revere Beach Reservation and one mile of the Revere Beach Parkway. The city has Union and Washington parks, Carter Field and Winnisimmet Parkway.

The industrial development of Chelsea is due to the large extent of its available water front. There are manufactories of rubber goods, shoes, brass goods, blacking, filters, webbing, chemicals, varnishes, electrical supplies, wall paper, boxes,

goring, whiting, extracts, woollens, machinery and other diversified products.

Chelsea was settled in 1626 as Winnisimmet and was part of Boston from 1634 to 1638, when it was incorporated as a town under its present name. In May, 1775, occurred a skirmish between British and American troops under Generals Stark and Putnam, the latter being victorious. The present towns of Winthrop and Revere were created out of parts of Chelsea. A city charter was received in 1857. Population in 1920, U. S. Census, 43,184.

Chemistry, *Kem'is try*, the science which deals with the composition of substances and the changes which these substances may sustain. Changes which affect the character of a substance are called chemical changes, and the properties affected by these changes are spoken of as chemical properties.

HISTORY. The beginnings of chemistry seem to be found in connection with philosophy and deal chiefly with theory rather than with experimentation. Philosophers seem to have agreed that matter was composed of four elements, earth, water, air and fire; and differences in properties were ascribed to different methods of combination of these elements. About four or five centuries before the Christian Era this belief gradually began to give place to the idea that matter is composed of one primal substance, and from this one all are produced. In the search for that one substance, the study of alchemy, the first period of true chemical study, began.

This primal principle, essence, arcanum or philosophers' stone, as it was variously called, was sought for assiduously by students of chemical lore, who performed their experiments secretly and then carefully guarded their results. Soon this theory of a primal element led to the thought that the so-called baser metals could be transmuted into the two nobler ones, silver and gold, by means of the philosophers' stone, and the study of alchemy descended from a search for knowledge to a frantic pursuit of the secret which should give to its finder

fabulous wealth. At present alchemy is chiefly remembered for this period of its existence, and many legends cluster about the age. No doubt many students worked with the sincere desire of learning the true secrets of nature, but the work of these is swallowed up in that of the greater number whose sole object was the search for the secret of wealth.

The literature of that time is interesting but not highly instructive, for, as one alchemist tells us, it was the desire of alchemists to "set pen to paper for the express purpose of concealing their meaning." For this reason they often introduced the word *not*, or purposely omitted it from the description of their experiments. Another common custom was that of describing an experiment in the form of a fable, so that the "vulgar should not learn," so jealous was each alchemist of his secrets. Toward the latter part of the alchemistic period the belief gained prevalence that the main difference between metals was that of age, as Jonson's alchemist, Subtle, says in the play, "All metals would be gold if they had time."

In spite of the many times that the announcement of the discovery of the grand arcanum had been made, alchemy began gradually to change from pure alchemy to an early form of modern chemistry whose path had been marked by these ancient experimenters.

During the 17th century Stahl, a German chemist, announced his phlogiston theory. This theory was that all combustible and oxidizable substances enclosed an element called *phlogiston*, which escaped in the processes of combustion and oxidation and left the substance dephlogisticated. This was held until the close of the 18th century, when Lavoisier conclusively proved it to be unfounded. At the beginning of this period Dalton, by the statement of the atomic theory, materially advanced the systematic study of the science, and by means of his laws, which are even yet based upon theory, many perplexing questions about the combination of elements were settled.

From that time on, the discovery of the various elements marked a new era in chemical theory, and at present more than 80 have been isolated, each of which is supposed to be individual and distinct from every other element.

At the beginning of the 20th century, with the discovery of radium and other radioactive elements and the undoubted disintegration of radium into helium, a new school of chemists has arisen, claiming that there is ground for the belief that many, at least, of our so-called elements spring from a common source, and are therefore not elements in the old use of the word. This idea, while well defended, is not yet fully enough developed to be commonly held.

DEPARTMENTS. Chemistry was early divided into two main divisions, organic and inorganic. The organic was so named because it was supposed that all compounds considered under this head could be produced only by the action of animal and vegetable life. In 1828 Wöhler, by the production of artificial urea in his laboratory, destroyed this belief, and the more accurate name "chemistry of carbon compounds," has been given. *Inorganic chemistry* refers to the study of the elements and their compounds which do not contain carbon. *Qualitative chemistry* is the study of the properties of the elements and their compounds and the various methods of preparing them. *Quantitative chemistry* deals with the amounts of the different elements which go to make up compounds. *Physical chemistry* is the borderland between physics and chemistry, and deals with physical properties of matter. *Electrochemistry* deals with the effects produced upon substances by electricity.

In later years attempt has been made to systematize chemistry by means of a universal nomenclature. Elements are understood to be substances whose molecules are made up of perfectly similar atoms. Compounds are formed by a certain number of atoms of one element uniting with those of other elements to form a molecule of the compound. The elements are generally divided into three

groups, the metals, the metaloids and the nonmetals, and between these there is no marked division. The metals have in general received names ending in *um* or *ium*. Compounds are given names which indicate their composition, a system of suffixes and prefixes being employed. See **LABORATORY**; **ATOMIC THEORY**.

Cheops, Ke'ops. See **PYRAMIDS**.

Cherbourg, Sher'boor', a fortified seaport of France, situated in the Department of Manche on the Cotentin Peninsula extending into the English Channel. Its great breakwater, begun in the time of Louis XIV and completed in 1858, lies over two miles from the harbor, which is protected by great forts. The engineering work connected with the harbor and breakwater was vast in extent. The arsenals, dockyards, machine shops and forges of the military station are immense and render this one of the great naval stations of France. The city itself is an old one set in wooded hills. Its chief attractions are the old Church of Sainte-Trinité, the town hall with its museum and gallery of paintings, the new hospital and two fine statues, one of Napoleon I and one of the artist Millet.

Cher'okee, one of the largest tribes of North American Indians. It is of Iroquoian stock and the members of the tribe live chiefly in Oklahoma. When they lived east of the Mississippi they were divided into two groups, the Upper and the Lower. The Cherokees recognized the English king as sovereign and allied themselves with the British, but after the Revolution they acknowledged the power of the United States. In 1838 they were forced to give up their territory east of the Mississippi. In the Civil War there was strife and civil disagreement among the Cherokees, some joining with the North, others with the South. There are now about 26,000 in Oklahoma and about 1400 on a reservation in North Carolina. They mingle freely with the whites and make liberal use of the government schools. See **FIVE CIVILIZED TRIBES**.

CHERRY

Cher'ry, a small orchard tree of the Rose Family valued for its fruit, which is also called the cherry. The tree is shapely and has a rugged bark, from which a thick gum is apt to exude. The branches are slender and graceful and bear oval, dark-green leaves that have deeply-marked veins and saw-toothed edges. The flowers are white-petaled blossoms with many stamens, and appear before the leaves in the spring, thus covering the trees with a mass of bloom. The fruit is familiar everywhere. There are two chief varieties, the sweet and the sour. The trees that bear sweet cherries are the larger, and the fruit is apt to be more meaty; in color the cherry may be creamy yellow, flushed with red, bright red or dark red. The fruit of the sweet cherry is not easily shipped because of its tendency to rot. The principal varieties are Black Tartarian, Windsor and Dikeman. Sour cherries are smaller and generally of a beautiful bright red color that forms a brilliant contrast to the intense green of the leaves. These cherries produce a valuable crop in many sections of the United States. The chief varieties are the Early Richmond and the Montmorency. In 1900 the yield of cherries in the United States was 2,873,000 bushels. France and Japan also raise large quantities of the fruit. The wood of the cherry is highly valued for furniture; it is dark in color and takes a high polish.

Cherry Laurel, a symmetrical little tree of the Rose Family, and closely allied to the plum and cherry tribes. It rarely attains a height of 40 ft. and is generally less than ten inches in diameter. The bark is smooth, or sometimes slightly marked by lengthwise grooves. The leaves are thick, leathery and evergreen, with rather broad orange-yellow stems. The flowers appear early in the year, sometimes opening in February in the most southern states. These flowers are in clusters which arise from the axils of the last year's leaf. They are scentless, with cup-shaped calyx, small, spreading petals and many flatly-extended stamens. The fruit is a shiny,

CHESAPEAKE AND LEOPARD

round stone fruit, smaller than that of the wild plum. The arrangement of the flowers in short clusters, never as long as the leaves, is the surest method of distinguishing it from the plum, which it closely resembles. The leaves and stones contain the poisonous hydrocyanic acid which renders them harmful to animals. Cherry laurel is found in the Southern States from North Carolina south and as far west as Texas, where it is sometimes called mock orange.

Cherry Valley Massacre, a raid and massacre perpetrated in central New York by a band of Tories, under Walter Butler, and a band of Mohawk Indians, under the famous chieftain Thayendanegea (Joseph Brant), Nov. 10, 1778. The village of Cherry Valley was a patriotic center and, consequently, an annoyance to surrounding Tories. The attack was made at night, about 50 persons, many of these women and children, being murdered. Others were driven from their homes. This massacre, together with that at Wyoming Valley, caused Washington to dispatch General Sullivan with 5000 men against the Iroquois of New York. See REVOLUTIONARY WAR IN AMERICA.

Chesapeake and Leopard, Affair of the, an incident of the summer of 1807, contributory to the War of 1812. The American frigate *Chesapeake*, on her way to the Mediterranean, was sailing out from Hampton Roads, June 22, when a lieutenant from a British ship, the *Leopard*, boarded her and demanded the deserters from the English men-of-war *Melampus* and *Halifax*. Commodore Barron of the *Chesapeake* refused to permit his ship to be searched, whereupon Captain Humphrey of the *Leopard* opened fire which it was impossible for the American vessel to return, as she was wholly unprepared. By the time three men had been killed and 18 wounded the *Chesapeake* surrendered, four sailors being taken from her deck. One of the deserters, a British subject, was hanged at Halifax, but the three Americans were forced to enter again the British service. Commodore Barron, for neglect of duty

in not being ready for an attack, was suspended for five years. President Jefferson demanded a disavowal of the act, but though some tardy reparation was made, the affair inflamed American opinion against England and helped largely to bring on war.

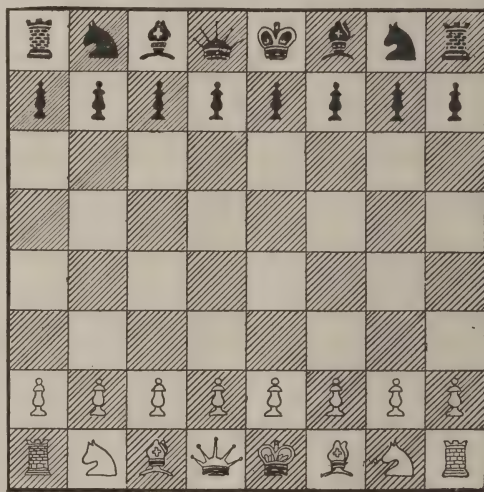
Ches'apeake and Ohio Canal, a canal, 6 ft. deep, about 50 ft. wide and 185 m. long, which afforded transportation between Georgetown, D. C., and Cumberland, W. Va. George Washington originated this project as early as 1774, and ten years later he became the head of a joint commission appointed by Maryland and Virginia to investigate the subject. On July 4, 1828, President John Quincy Adams formally inaugurated the work. The canal was completed in 1850 at a cost of about \$10,000,000. It was been useful principally in the transportation of coal.

Chesapeake Bay, an inlet on the Atlantic coast of the United States, penetrating Virginia and Maryland and dividing the latter into two parts. It is 200 m. long, and varies in width from 12 m. at its entrance to a maximum width of 40 m. There are several estuaries of navigable rivers, including the Susquehanna, Potomac, Rappahannock, James, York, Chester and Elk, as well as gulfs, all of which afford navigation for large vessels. Baltimore and Norfolk have been developed into extensive shipping ports, both for foreign and home trade. The oyster beds in Chesapeake Bay are valuable, making oyster farming one of the leading industries. A large amount of garden stuff is produced along the shore lands, and a number of waterfowls frequent the waters of the bay. A canal connects Delaware Bay and Chesapeake Bay. See CANAL; OYSTER.

Ches'nut, Thomas Herbert (1862-), a Canadian author and critic, born in Toronto. When 15 he edited the *Canadian Magazine*, a boys' sheet; later he worked for the Bank of Hamilton, but about 1892 made connections with the *Toronto Sunday World* and the *Globe*, as a writer on musical subjects. He was musical critic for the *Montreal*

Standard, under the pen name Siegfried, and for the *Toronto Music and Trades Journal*. After later serving with the *Montreal Witness*, he entered journalism in the United States. His works include *Pierson of "Ours," A Stradivarian Stratagem* and *A Maiden of the Shield*.

Chess, a game of great antiquity, which requires more intellectual power than any other game of skill. It is played by two persons, either or both of whom may, if it is so agreed, have as many counselors as desired. The checkerboard of 64 squares is used, being so placed that each player has a white corner square at his right. The eight *pieces* and the eight *pawns*, which stand in front of them, are commonly white for one



CHESSBOARD AND MEN

player and black for the other. Their initial positions are indicated by the accompanying illustration. In front of the king is the king's pawn; at his right the king's bishop's pawn; the king's knight's pawn and the king's rook's pawn. The white queen stands on her own color and at the left of her king; the black queen likewise, on her color. Each of the 64 squares on the board is designated by row and file. Hence, for each player there are in the king's rook file, first, the king's rook square; then king's rook 2; k. r. 3, etc., to k. r. 8, white king's rook 8

being black king's rook square. This makes it possible for an exceptional individual to play blindfolded, and for individuals or clubs to carry on games by correspondence or by telegraph.

It is the purpose of each player to develop such a situation that at the next move he may win by *checkmating* his opponent's king; that is, threatening him with an attack from which there is no escape and by which any other piece would necessarily be displaced. If neither is able to checkmate, the score will show a drawn game. One is at no time obliged to displace his opponent's man because the opportunity exists, but may carry out any plan of attack that commends itself to him. Because of their varied powers, the men used in chess are valued approximately as follows: pawn, 1; bishop, or knight, 3; rook, or castle, 5; and queen, 9. A man is lost when displaced. The pawn moves forward only; two squares at the first move, if desired, but after that only one. Then displacing an opponent, however, he moves forward one space *diagonally*, right or left. If a pawn reaches row 8, he is replaced by a queen or by some other efficient piece desired by his owner. This is called *queening the pawn*, and may result in the presence of several white, or several black, queens at one time. The knight never moves in a straight line, but can jump over other pieces; and, if near the center of the board, he can displace an enemy from any of eight squares, since he can jump two spaces in either direction and one sidewise. The bishop moves *diagonally*, necessarily keeping on his own color, but to any desired distance so long as his path is unobstructed. The castle, or rook, likewise, has a range limited only by the enemy's actual obstructions or the desirability of avoiding risk, and moves in either direction along the row or file on which it stands. The queen has the combined powers of the castle and bishop, and for this reason is the most powerful piece on the board. The king, like the queen, can move in any direction, but commands only the squares immediately adjacent, not exceeding eight.

Once during a game, provided that the squares between the king and either castle are clear, that neither the king nor this castle has yet been moved, that the king is not attacked and no enemy commands the way, the king may move two squares toward that castle selected, which, at the same time, may move to that square over which the king has passed. This is called *castling*.

Notice of attack upon the king must be indicated by saying "check." This requires his removal from danger, the interposition of a protecting man or the displacement of the threatening adversary. The king may not be moved into *check*; but, if necessary, all other men must be sacrificed in his defense. If either player, through inadvertence or lack of skill, blocks his opponent's king so that he cannot move without going into check, and none of his men can be moved without exposing him, the king is *stale-mated*, and the score should show a drawn game.

Ches'ter, Pa., a city of Delaware Co., 14 m. s.w. of Philadelphia and 14 m. n.e. of Wilmington, Del., on the Delaware River and on the Baltimore & Ohio, the Philadelphia & Reading, and the Philadelphia, Baltimore & Washington Division of the Pennsylvania system. Several lines of steamers connect the city with the various Delaware River ports. The favorable location and excellent shipping facilities have given the city a diversity of industries. An excellent system of electric railroads connects with Darby, Media, Philadelphia, Wilmington and other near-by towns and cities.

PUBLIC BUILDINGS. Chester has a number of interesting buildings dating from the early part of the 18th century. Of historic interest are the city hall built in 1724, one of the oldest buildings in the United States, and the house of William Penn. Other public buildings include the Federal Building, several banks and a Y. M. C. A.

INSTITUTIONS. The most noted educational institution is Crozer Theological Seminary (Baptist), located in the borough of Upland, a suburb of Chester.

This seminary was opened in 1868 and named after John P. Crozer, by whose family it was founded. Chester is also the seat of the Chester Academy and of the Pennsylvania Military College. Swarthmore College (Friends) is located in the borough of Swarthmore near the city. There is also a public library. Among the public institutions are the Chester and Crozer Homeopathic hospitals.

INDUSTRIES. The shipyards of Chester are among the largest in the country, and several vessels of the United States navy have been built here. There are also manufactories of cotton, worsted and woolen goods, furnaces, steel tubing, castings, cutlery, engines, boilers, dye-stuffs, leather, lumber products, cigars, plaster and ice.

HISTORY. Chester is the oldest town in Pennsylvania, having been settled in 1644 by the Swedes, who gave it the name of Upland. When William Penn arrived in 1682 he gave the town the name of Chester. During the Revolution the British and Americans occupied the place alternately, and after the Battle of Brandywine in 1777 Washington reassembled his troops here. Chester was incorporated as a borough in 1701 and chartered as a city in 1866. Population in 1920, U. S. Census, 58,030.

Ches'terfield, Philip, EARL OF (1694-1773), an English writer. He was appointed ambassador to The Hague in 1728, and held various political positions until 1748, when he retired because of ill health. He was on intimate terms with Swift, Pope and Bolinbroke, and at one time endeavored to appear the patron of Samuel Johnson, being repudiated by that sturdy writer in a celebrated letter. Chesterfield's best-known writings are his letters to his son, in which he sets forth the principles of good manners.

Ches'terton, Gilbert Keith (1874-), an English author and critic, born in London. He studied at St. Paul's School, became interested in art and later devoted his time to writing for London newspapers and periodicals. His prose style is vigorous and, though some-

times marred by an overfondness for extreme paradox, has attracted to itself and to the thought it conveys no inconsiderable attention. After devoting most of his time to literary criticism and philosophic speculation, often radical to an extreme degree, he turned his attention also to fiction writing. His works include *Robert Browning*, *The Napoleon of Notting Hill*, *Heretics*, *What's Wrong with the World?* *Appreciations and Criticisms of the Works of Charles Dickens*, *The Man Who Was Thursday*, *Bernard Shaw*, *All Things Considered*, *The Innocence of Father Brown* and *Manalive*.

Chestnut, Ches' nut, a handsome and valuable tree of the Oak Family, growing in southern Europe and eastern United States. If growing in forests, it becomes an exceedingly tall tree, attaining a height of 100 ft. or more, but when by itself it spreads out and acquires a beautifully rounded form. The trunk is straight and cylindrical and covered with a grayish bark, which is marked with shallow ridges. The leaves are long and pointed, smooth on both sides but darker above than below. The veins are tough and end in sharp points which give the edges a scalloped appearance. In June or July great bunches of golden catkins add to the beauty of the tree and give fragrance to the summer air. The fruit is a cluster of nuts which are well protected by a spiny covering that bars out all intruders until the nuts are ripened. The bur then opens and ejects three soft-shelled, sweet nuts eagerly sought by children. The shell of these nuts is a chestnut-brown in color at the base, which is somewhat swollen, but at the top is covered with a grayish down which ends in a threadlike spur; in shape the nut is rather flattened upon one side. The chestnuts raised in the United States are edible, but the nuts, so popular about Christmas time, are generally brought from Spain, where the nuts are larger and sweeter.

The wood of the chestnut is durable and useful as a lumber, and the bark, which contains a high per cent of tannin, is valuable for tanning purposes.

Chewink'. See TOWHEE, *Tow' hee*.

Cheyenne, Shi'en', a tribe of North American Indians of the Algonquian family. They have lived on the Cheyenne River in North Dakota and among the Black Hills of South Dakota, and the 3200 now in existence live on a reservation in Arizona and in Oklahoma. The Cheyennes opposed the encroachment of the whites to the last, and were one of the latest tribes to submit to the National Government.

Cheyenne, Wyo., county seat of Laramie Co. and capital of the state, 106 m. n. of Denver, on Crow Creek and on the Chicago, Burlington & Quincy, the Union Pacific and the Colorado Southern railroads. The city has an altitude of 6050 ft. above sea level and is situated near the foot of the Laramie range of mountains. Cheyenne adjoins Ft. Russell, one of the four largest military posts in the United States. An electric railway connects the fort with the city. The surrounding country is an agricultural, grazing and mining region. The streets of Cheyenne are wide and well surfaced, and there is a fine park system.

The noteworthy buildings include the capitol, modeled after the National Capitol in Washington, Federal Building, costing \$400,000, Elks' Home, Masonic Temple, hotels, including The Plains, which cost \$300,000, and fine church, school, municipal, bank and library buildings. There is a Catholic cathedral. The educational institutions include a high school and public and private schools. There is also a children's home and a convent. Cheyenne has many manufacturing establishments. There are large pressed-brick plants, a modern packing house, an ice plant, and a large trade in agricultural implements. The government and state experimental farms show the results of dry-farming and irrigation methods. Large railroad shops are located here. The city is a supply point for a large amount of the trade of the Rocky Mountain region.

The first settlement was made in 1867 and named from the Cheyenne Indians. The town was incorporated in 1869 and

chosen as the site of the state capital the same year. Population in 1920, 13,829.

Chicago, Shi kah' go, the metropolis of Illinois, county seat of Cook Co., the second city of the United States and fourth largest city in the world, is situated on the western shore of Lake Michigan, 911 m. from New York, 811 m. from Washington and over 2300 m. from the Pacific coast. The city is built on level land, which rises but a few feet above the level of the lake. Its outline is, in general, rectangular, but the western boundary is irregular. The area is about 200 sq. m. The city proper extends north and south along the lake for 24 m., and its greatest extent east and west is 10½ m. Chicago and suburbs have a lake frontage of 30 m. The Chicago River, formed by the North and South branches, enters the lake about midway between the northern and southern limits and divides the city into three distinct sections, known respectively as the North Side, the West Side and the South Side. The North Side includes the section north of the river and east of the North Branch. The South Side includes the section south of the river and east of the South Branch, and the West Side includes all west of the river.

The South Side is the most extensive, has the largest population and includes the great business center, known as the Loop District, which extends from the river southward to 12th Street. The freight depots, grain elevators and warehouses are located on or near the river banks. The stream has been dredged to make it navigable for lake steamers, and most of the docks lie along the river. This part of the city also contains numerous manufactories. Within the Loop District are the chief centers of the wholesale and retail trade, four of the six railway stations, the leading banks, offices of the great newspapers, the leading hotels, theaters and office buildings. The Union Stockyards are located on the South Side on Halsted Street, and extend from 39th to 43rd streets. This region is also the leading manufacturing center of the city. Back from the river on the

West Side there are also many light manufacturing establishments. The residential sections surround the business and manufacturing center and in a number of instances extend in an unbroken line to the suburbs.

STREETS AND LOCAL TRANSIT. The city is regularly laid out, and the streets, with few exceptions, extend north and south and east and west. The streets are broad and straight, and the building line has been observed throughout the city. Some of the north and south streets, as Halsted Street and Western Avenue, extend nearly the entire length of the city. Within the Loop District, State Street is the center of the retail trade. Wells Street is the wholesale center for the dry-goods trade, and South Water Street is lined with produce markets. In the residential sections the streets are beautified by shade trees. There are over 4800 m. of streets and 6000 m. of sidewalks within the city limits. For the purpose of numbering, State Street is taken as the base line for numbers running east and west, and Madison Street is the base line for numbers running north and south. There are 800 numbers to the mile, and the location and distance of any point from the downtown center is readily determined by its number. For instance, 4800 N. Clark is on Clark Street six miles north of Madison; 2400 W. Madison Street is three miles west of State Street.

There are over 1350 m. of street railway and about 70 m. of elevated railway. These lines connect all parts of the city and adjoining suburbs with the Loop District and furnish quick and convenient transportation. The Oak Park Elevated extends to Oak Park, and the Northwestern through Evanston to Wilmette. There are also a number of lines extending to near-by cities. The most important of these are the Aurora, Elgin & Chicago, the Chicago & Joliet, the Chicago & Southern and the Chicago & Milwaukee. The Aurora, Elgin & Chicago and the Chicago and Milwaukee enter the Loop District. All railways entering the city run suburban trains to ac-

commodate local traffic. The river is spanned by numerous bridges, most of them of the bascule, or lift-bridge type, and there are three tunnels by which some of the street-car lines enter the Loop District. A system of tunnels over 60 m. in extent connects all the freight depots, passenger stations and large wholesale and retail stores, and is of great value in distributing freight. These tunnels are not open to passenger traffic.

WATER SUPPLY AND SEWAGE. The water supply and sewage systems of Chicago include some of the most extensive engineering works in the country. The water is taken from Lake Michigan, the intakes, or "cribs," being located from two to four miles from the shore and connected with their respective pumping stations by tunnels. There are nine pumping stations and 56 m. of tunnels. From the pumping stations the water is distributed to all parts of the city through mains. Formerly the sewage went into the lake, but the rapid growth of the city made it necessary to find some other means of disposing of the sewage, and in 1889 the Sanitary District was organized for the purpose of constructing the Chicago Drainage Canal. This gigantic work was completed in 1900 at a cost of \$66,000,000. It changed the current of the Chicago River so that it now flows from the lake. Intercepting sewers carry the sewage to the canal, which flows into the Des Plaines River. Chicago is now said to have the purest water of any large city in the world. See CHICAGO DRAINAGE CANAL.

BUILDINGS. Most conspicuous among the public buildings is the City and County Building, occupying the square bounded by Randolph, Clark, Washington and LaSalle streets. It is a steel and granite structure, 314 by 370 ft. and extending 205 ft. above the level of the street. The building, which is in modern classic style, with a row of Corinthian pillars on each side, is a dignified and imposing structure. At the Clark and LaSalle Street entrances are carved allegorical figures representing *Justice*,

Law, Labor on Land and Labor on Sea, by Herman A. MacNeil and Leon J. Hermand. The interior is finished in marble, bronze and ornamental glass. The building and finishings cost about \$10,000,000, and it is the finest municipal and county building in America.

An equally imposing structure is the Federal Building, occupying the square bounded by Adams, Dearborn, Jackson and Clark streets. The building is in the form of a cross 311 by 386 ft., with a large dome rising over the center to the height of 297 ft. The architecture is Roman Corinthian. The exterior is of granite, and the interior is finished in marble, bronze, oak and mahogany. The building houses about all the government offices in the city; but by far the greatest amount of space is occupied by the post office. In the dome, occupying all the 14th floor, is the office of the United States Weather Bureau, the largest outside of Washington.

Among other public buildings of note is the Coliseum on Wabash Avenue, near 16th Street, an immense structure having a seating capacity of 14,000. Several national political conventions have been held in it, and it is also a favorite place for large exhibitions. The Art Institute on Michigan Avenue, opposite Adams street, is one of the most beautiful buildings in the city, and Orchestra Hall near by is one of the most perfect concert halls in America. It was erected by subscription for the Theodore Thomas Orchestra as a memorial to the founder of this organization, now known as the Chicago Symphony Orchestra.

The leading mercantile establishments include the wholesale and retail stores of Marshall Field & Company, the great retail stores of Mandel Brothers, Carson, Pirie, Scott & Company, the Fair, the Boston Store, Rothschild & Company, The Hub, McClurgs, and Stevens. Taken together, these form the largest group of great retail stores in the world, and they are all included in a space of seven blocks on State Street. This aggregation of great stores is a peculiar feature of the city. The retail store of

Marshall Field & Company is the largest establishment of its kind in the world.

The Masonic Temple, with a height of 278 ft. above the street, is the most widely known, as well as the most conspicuous among the office buildings. It was the first high building of the steel-structure type in the country, and while higher buildings have since been erected in other cities, its completion made Chicago the original home of the "skyscraper." Within the Loop District are many office buildings varying from 16 to 20 stories in height, and their number is rapidly increasing. Some of the most conspicuous are the Wrigley McCormick, the Monroe, Insurance Exchange, People's Gas Light and Coke Company, the Karpen, the North American, the Lytton, the Monadnock, the Marquette and the Royal Insurance buildings. The most important bank buildings are those of the Continental National, the First National, the Illinois Trust and Savings, the Northwestern Trust and Savings, the Corn Exchange and the Harris Trust and Savings banks. Among the older buildings of interest because of their history and present importance are the Board of Trade Building, the Chamber of Commerce, the Stock Exchange, the Temple and the Pullman Building, occupied by the offices of the Pullman Company.

The leading hotels are the Auditorium, the Congress, the Blackstone and the Stratford, all on Michigan Avenue; the LaSalle, the Sherman, the Great Northern, the Grand Pacific, the Palmer House and the New Brevoort. The Metropole, the Chicago Beach Hotel and the Windmere on the South Side, and the Edgewater Beach and the Drake on the North Side are family hotels. The Auditorium, with a seating capacity of 5000, and an immense stage and beautiful wall decorations, is the leading theater. Together with the Auditorium Hotel it occupies a massive stone structure, which constitutes one of the most substantial buildings in the country. Other theaters of note are the Blackstone, the Illinois, the Studebaker, Cohan's Grand Opera

House, McVickers, Powers, the Garrick, the Olympic, the Majestic, the Princess, the Colonial, Cort, Woods, Apollo, State-Lake, Roosevelt, Lelwyn and Chicago.

PARKS AND BOULEVARDS. The public parks have a combined area of about 4600 acres and additions are being made each year. The park system includes large parks, small parks, children's playgrounds and boulevards and parkways. The system is one of the most elaborate and wisely planned of any in the United States. The parks and boulevards are so located as to place one or more recreation grounds within easy reach of the resident population and at the same time make them accessible to the residents of the most densely populated sections. Lincoln Park, extending northward almost three miles along the lake shore, is the largest park of the system. It has been materially extended by made land formed by dredging the lake. The Lake Shore Drive extends the entire length of the park along the eastern side. There are numerous other shaded drives, walks and bridle paths. The northern part of the park contains a grove of native trees. Near the center of the park is a large conservatory, besides a beautiful landscape garden and an area devoted to native wild flowers and the common plants of the household yard and garden. To the east of these gardens and extending nearly to the lake are the animal houses, which shelter one of the most complete collections of wild animals, birds and reptiles in the country. Facing Clark Street at the central entrance is the Lafflin Mills Memorial, a beautiful building which is the home of the Chicago Academy of Sciences. Lincoln Park is noted for its statuary. Foremost among its works of art is the bronze statue of Abraham Lincoln, at the Dearborn Street entrance, for whom the park was named. It is by St. Gaudens and is the most perfect likeness of Lincoln in bronze. Other statues of note are the equestrian statue of Grant, the statues of Linnaeus, Schiller, Shakespeare, LaSalle, Hans Christian Andersen and Benjamin Franklin, and several groups representing phases of In-

dian life. The park also contains two lagoons, used for boating and skating, refectories, public bathing beaches, a number of tennis courts and baseball grounds, and a children's sanatorium, which is maintained by the Chicago *Daily News*.

Grant Park, extending along the lake front from Randolph Street to Park Row, is within easy walking distance from any point within the Loop District, and is a favorite place of recreation during the noon hour. The Art Institute is within the park. It also has an equestrian statue of General John A. Logan, by St. Gaudens, and a fountain *The Spirit of the Great Lakes*, by Lorado Taft. At the south end of Grant Park is located the new home of the Field Museum, containing one of the largest and most attractive collections in America.

Jackson Park is the largest park on the South Side. It extends along the lake for one and one-third miles and was the site of the World's Columbian Exhibition in 1893.

It contains nearly eight miles of drives, numerous walks and bridle paths, lagoons, rose gardens, beautiful shade trees and shrubbery and numerous tennis courts, extensive golf links, Bathing Beach, yacht harbor, and large ball grounds.

Some of the buildings left from the exposition are the Fine Arts Building, German Building, now used as a restaurant; the Convent of La Rabida; and three Japanese buildings, presented by the Japanese Government to the city. Cahokia Courthouse, considered to be the oldest building in the Mississippi Valley, stands on Wooded Island, having been removed to the park from the Louisiana Purchase Exposition in St. Louis. Its original site was in Cahokia, Ill.

West of Jackson Park and connected with it by the Midway Plaisance, a magnificent boulevard, a mile long and 660 ft. wide, is Washington Park, the second largest park on the South Side. It contains several lagoons, numerous shaded drives, walks and bridle paths, and is widely known for its landscape

gardening. At the Grand Boulevard and 51st Street entrance is the equestrian statue of Washington, by French.

Among the larger parks on the West Side are Douglas; McKinley, containing a statue of the martyred president; Garfield, which has the largest conservatory in America and the second largest in the world; and Humboldt, noted for its shrubbery and beautiful drives and walks. There are over 70 small parks, so located as to be easily reached by residents of the densely populated centers. These parks contain playgrounds for boys and girls, swimming pools and field houses, fitted up with baths and gymnasiums for both men and women, and also containing numerous halls, clubrooms, libraries and kindergartens. Surrounding the city are the Forest Preserves with thousands of acres of woodland, much of which is still in its natural state.

The boulevard system connects all the parks and has a total mileage of about 70 m. The most important boulevards extending north and south are Michigan Avenue, Drexel and Grand. The first connects on the north with the Lake Shore Drive, which, under the name of Sheridan Road, extends northward far beyond the city limits. Garfield, Jackson, Washington and those of the Humboldt Park system are the principal east and west boulevards. All boulevards have asphalt pavement, are lined with shade trees and contain occasional flower plots. Michigan Avenue from Randolph Street to Park Row has Grant Park on the east. It is beautifully lighted and is one of the finest streets in America. The Municipal pier is a great attraction.

INDUSTRIES AND COMMERCE. Chicago is the natural distributing center for a region containing nearly one-half the population of the country. It is likewise the most convenient meeting point for the coal from Illinois and Indiana, and the iron ore, lumber and other raw material from the North. These conditions have been the cause of the city's phenomenal growth as a commercial and industrial center. Besides the factories located along the river, there are nearly

20 manufacturing districts in and about the city, and the industries include almost every line of manufactures found in the country. Chicago is the largest live-stock market and the greatest slaughtering and meat-packing center in the world, and this industry, with an annual output valued at more than \$330,000,000, is the leading industry. At South Chicago are large iron and steel mills and shipyards. Pullman contains the extensive works of the Pullman Palace Car Company, and the International Harvester Company have their largest factories, the Deering and the McCormick factories, located here. Chicago is the largest lumber and grain market in the country. It is second only to New York in the manufacture of men's clothing, and is one of the leading centers in the manufacture of furniture, pianos and other musical instruments and many other commodities in general use. It is also the second city in the country in printing and publishing. The value of the yearly output of all the city's manufactures exceeds \$6,000,000,000.

TRANSPORTATION. Chicago is the greatest railway center in the world. Over 30 trunk lines, with an aggregate mileage exceeding 85,000 m., have terminals in the city. These lines and their connections include over half the railway mileage in the country. There are six large passenger stations. The most modern and complete of these is the new terminal station of the Chicago & North Western Railway. The LaSalle Street Station, owned by the Lake Shore & Michigan Southern and the Chicago, Rock Island & Pacific systems, is also a beautiful and commodious structure. Freight depots are located at convenient points throughout the city, and belt lines of railway extend around three sides of the city, connecting all railways and terminals. By means of these lines freight is easily transferred from one part of the city to another and from one railway to another. The railways entering the city extend to all parts of the United States and to Canada, making Chicago the second great transportation center.

Through Lake Michigan the city has water transportation connecting it with all the ports on the Great Lakes, and by means of the St. Lawrence River and canals, with the Atlantic seaboard, though ships seldom pass from the lakes to the ocean. During the season open to navigation numerous lines of steamship ply between Chicago and the other large ports on the lakes. Some carry freight only, and a few are exclusively passenger boats, but most of them combine freight and passenger traffic. During the summer numerous excursion boats make daily trips between the city and near-by ports in Michigan and Wisconsin and offer recreation to thousands of people. Plans are under way for greatly extending the harbor facilities. The Chicago Drainage Canal is intended for a ship canal, and, when connections are made with the Illinois River, will be the connecting link in a deep waterway extending from the Great Lakes to the Gulf of Mexico.

CHURCHES AND SCHOOLS. Chicago is fully alive to the religious, educational and charitable needs of its citizens. There are over 1200 churches representing all denominations, besides numerous ethical societies representing systems of philosophy. The most important church edifices include the Cathedral of Holy Name (Roman Catholic), the Second Presbyterian, the St. James Methodist, the Immanuel Baptist, the Cathedral of Saints Peter and Paul (Protestant Episcopal); the First Unitarian, the Church of the Redeemer (Universalist) and the First Church of Christ Scientist. The Sunday Evening Club, an interdenominational organization, maintains services in Orchestra Hall every Sunday evening, except during July and August.

The public school system is one of the best in the country. The city employs over 8500 teachers and enrolls over 377,000 pupils in its public schools. The Teachers' College, with three practice schools for training teachers, is at the head of the system. There are three manual-training schools of high-school grade and about 180 institutions in which

manual training and domestic science are taught. There are three centers for education of the blind, two for crippled children and 12 for the deaf. A number of evening schools are maintained during the fall and winter months, and a number of vacation schools during the summer. The Parental School and John Worthy School are for truant boys. There are also a large number of parochial schools.

Among the higher institutions of learning the University of Chicago is the most important (See CHICAGO, UNIVERSITY OF). Northwestern University, with its central offices and School of Liberal Arts at Evanston, has its professional schools in Chicago (See NORTHWESTERN UNIVERSITY). Armour Institute of Technology and Lewis Institute are technical schools of high grade. Loyola University, with its departments of law, medicine, pharmacy and engineering, and St. Ignatius College are important institutions under the auspices of the Roman Catholic Church. The Y. M. C. A. College gives instruction to a large number of men and boys who are employed during the day. The Art Institute, besides having one of the most valuable collections of paintings, sculptures and antiques in the country, maintains an art school of large proportion, including day and night classes for teachers. The Chicago School of Applied and Normal Art is another art school of high grade. There are a number of medical colleges, schools of pharmacy and schools of dentistry within the city. The University of Chicago maintains a Divinity School. This and the Chicago Theological Seminary (Congregational), the McCormick Theological Seminary (Presbyterian) and Garrett Biblical Institute (Methodist Episcopal), located at Evanston, are among the leading theological schools of the country.

LIBRARIES AND MUSEUMS. There are more than 100 libraries of a more or less public nature. Over 65 of these are open to the public under certain restrictions, and their combined collections exceed 1,463,000 volumes. In popularity

the Chicago Public Library is the most notable. It occupies its own building on Michigan Avenue, extending from Washington to Randolph streets. The interior is finished in marble and glass mosaic, making it one of the most beautiful as well as one of the most commodious library buildings in the country. It contains over 500,000 volumes, and maintains about 20 branches and over 100 delivery stations. The Newberry Library, occupying a beautiful granite building on Clark Street and Walton Place, has valuable collections on history, literature, philosophy and education. It also possesses a rare collection of the oldest books and manuscripts, and the walls are adorned with numerous choice portraits. This is a reference library, and books cannot be taken from it. The John Crerar Library, now occupying its new home at the corner of Randolph and Michigan Avenue, is also a reference library. It is devoted to economics, industries and scientific subjects and possesses the Nicholas Senn Medical Library, which includes a large number of valuable medical works. The Library of the Chicago Historical Society contains much valuable material bearing upon the history of Illinois and Chicago. It also has a large collection of portraits, maps and photographs. The Library of the University of Chicago contains over 400,000 volumes and is open to the public under certain restrictions.

The Field Columbian Museum in Grant Park contains valuable collections pertaining to the ethnology of North and South America, and extensive collections in mineralogy, botany and zoology. The Academy of Sciences in Lincoln Park also has very complete collections of native birds, animals and insects, all especially arranged for study by the pupils of the public schools.

INSTITUTIONS. The city has a large number of philanthropic and charitable institutions. The United Charities and Hebrew Charities maintain trained inspectors, who devote their entire time to the relief of the poor and needy and see that charity is properly bestowed. Among

the many hospitals the Cook County, the Augustana, the Paskevitch, St. Luke's, Mercy, Wesley, Alexian Brothers and the Presbyterian are especially worthy of note. Hull House, the leading social center, has gained an international reputation. Other important social settlements are Chicago Commons, University Settlement and Northwestern University Settlement. See **SOCIAL SETTLEMENTS**.

GOVERNMENT. The chief executive power is vested in the mayor, who is elected for four years. He is assisted by a council consisting of two aldermen from each ward. The heads of the police, health, water, fire and other departments of the city government are appointed by the mayor, but most of the other members of these departments are under civil service regulations and cannot be removed for political purposes. The city has its own system of courts.

HISTORY. Marquette and Joliet were the first white men to visit the site of Chicago in 1673, on their return from the discovery of the Mississippi River. The Marquette-Joliet Memorial Cross at Robey Street and the South Branch of the Chicago River marks their landing place. Ft. Dearborn was built on what is now the corner of Michigan Avenue and River Street in 1804. In 1812 it was the seat of a notable Indian massacre. From 1816 to 1837 it was a military post. In 1830 the settlement numbered 100. In 1835 a city was organized, with a population of 3265. The first railroad, a branch of the North Western, was completed in 1848. With the settlement of the surrounding country the city's phenomenal growth began. In 1870, the year before the great fire, the population was 298,977. The fire destroyed all the business section; but the city was rapidly rebuilt on a scale of much greater magnificence, and in 1880 had a population of over 500,000. No city in the world has increased so rapidly in population, industries and wealth. The Association of Commerce, an organization of more than 400 firms, exerts a marked influence on the city's welfare, and is instrumental in securing the

organization and successful promotion of many large enterprises. The population, which embraces almost every nationality, increases at the rate of about 50,000 a year. In 1920, the population was 2,701,705. Consult Winchell *A Civic Manual of Chicago and Cook County*; Chicago, by the Association of Commerce.

Chicago Drainage Canal, a canal, begun in 1892 and completed in 1900, by which the sewage of the city of Chicago is diverted from Lake Michigan, the source of the city's water supply. Diluted by an immense flow of lake water, this is carried (40 m.) by the canal to the Des Plaines River at Joliet, whence, through the Illinois and Mississippi rivers, it finds its way to the Gulf of Mexico. In rock sections this canal is 150 ft. wide on the bottom; in earth sections, from 110 to 202 ft. The depth of water is never less than 22 ft., and the flow, which averages over 300,000 cu. ft. per minute, and may be increased to 600,000 cu. ft., is regulated by controlling works at Lockport. The development of great electric power here and on the Illinois River has thus been made possible; while projects for the deepening of the Illinois and Mississippi, to permit the passage of large lake boats from Joliet to the Gulf, have attracted more and more attention in Congress. The total cost of such a waterway (from Joliet to the Gulf) is estimated at \$69,000,000, of which Illinois is pledged to contribute \$20,000,000.

The Drainage Canal was constructed by the Sanitary District created for the purpose, and is considered one of the greatest engineering feats of the country. In 1910 the North Shore Drainage Channel was completed. This begins north of Evanston, and is about eight miles long. It carries into the Drainage Canal all the sewage from the North Side of the city and, including the lake water forced in by powerful pumps, its flow measures 60,000 cu. ft. per minute. This channel cost about \$3,000,000, while the Drainage Canal proper had cost some \$33,000,000. In all over \$66,000,000 has been expended on the enterprise.

Chicago, University of, at Chicago, Ill., (1890). A Baptist institution, the (old) Chicago U., founded in 1857, closed its doors in 1886. Through the efforts of prominent Baptists, the present university was organized; and the charter requires that the president and two-thirds of its trustees must be of that denomination. Otherwise the institution is non-sectarian. The munificent gifts of Mr. John D. Rockefeller, known as its founder, have been supplemented by large donations from many others. In 1921 its assets were approximately \$48,000,000, of which \$29,000,000 represents the endowment fund. The university has an extensive site, and numerous buildings which are at once enduring, impressive and designed especially for those purposes to which they are devoted.

The magnificent Harper Memorial Library, which faces the Midway Plaisance, now houses that splendid and rapidly growing collection which already includes six hundred thousand carefully chosen volumes.

The university is organized on the four-quarter system. By this plan its enormous investments in buildings, library and equipment are made to serve the people throughout the entire year. The graduate schools, the extension work, the four-quarter year whereby there is continuous use of the extensive plant and equipment, the fully developed college of education and the scholarly character of the many publications, all evidence the efficient co-operation of master minds. The university is co-educational. It enrolls some 6,000 students; and, during its summer quarter, it is the Mecca of hundreds of teachers from many states. See ROCKEFELLER, John DAVISON; HARPER, WILLIAM RAINEY.

Chick'adee, a bird of the Titmouse Family. The chickadee is about the size of a canary and may be known by its black crown and throat, gray body and brownish flanks. These birds are born acrobats, restlessly hopping about the forest, often hanging downward from the branches in their search for insects.

Their cheerful "chick-a-dee, chick-a-dee-dee-dee" gives life to the almost deserted woods when most of the birds have sought warmer climes. The chickadee is said to eat over 5000 eggs of the canker-worm daily during the season of this insect pest, and it is especially fond of the caterpillar and moth. The nest is made in a hollow, either borrowed or made by the chickadee, is lined with moss, feathers and fur, and contains four to eight



CHICKADEE

spotted eggs. The chickadee lives in the northeastern United States and southeastern Canada, and is migratory only in the central part of the United States.

Chick'amauga, Battle of, an important and one of the most destructive battles of the Civil War, fought on Sept. 19 and 20, 1863, between 60,000 Federals under General Rosecrans, and 70,000 Confederates under Gen. Braxton Bragg. Having left Murfreesboro, Rosecrans skillfully forced Bragg to leave Chattanooga and retire to a mountain stream in Georgia, whose Indian name, Chickamauga, means River of Death. Suddenly and unknown to the Federals the Confederates were reinforced, whereupon Bragg turned about to attack Rosecrans in Chickamauga Valley, where Thomas commanded the Federal left wing, Crittenden the center and McCook the right, along the creek. On the first day heavy skirmishing took place, gradually becoming a battle. The following day General Wood misunderstood an order, and in consequence a wide gap was left in the Union center, into which Longstreet immediately marched a powerful Confed-

erate force. This swept from the field the Union right wing, including Rosecrans, McCook and Crittenden. The left wing, however, under Thomas, withstood the enemy for six hours, thus saving the Federal army from utter rout. Finally, Thomas was summarily ordered to retreat from an engagement which won him the sobriquet, "The Rock of Chickamauga." The Federals lost 16,000 men; the Confederates, 18,000.

Chick'asaw, a tribe of North American Indians once ranging through Mississippi and Tennessee. De Soto visited them in 1540. They were hostile to the French but friendly to the English. They ceded the last of their territory to the United States in 1834, when they moved to Oklahoma. They sided with the Confederate States in the Civil War. The Chickasaws of pure blood number about 6000. See FIVE CIVILIZED TRIBES.

Chick'asha, Okla., a city and the county seat of Grady Co., about 45 m. s.w. of Oklahoma City, near the Washita River and on the Chicago, Rock Island & Pacific, the St. Louis & San Francisco, and on branch lines of the A. T. & S. F., and R. I. railroads. Situated in the fertile Washita Valley, in which are produced quantities of Indian Corn, fruits, vegetables and cotton, the city is an active trade center. Stock raising is an important industry, and there are various manufactures, including cotton-oil products and machinery, lumber, furniture and flour. The Oklahoma State College for Women is located here. The place was founded in 1892 and has had a rapid growth. It was chartered as a city in 1899. Population in 1920, 10,179.

Chicle, Chik'l, a gum produced by tropical and semitropical trees of the Soapwort Family and secured as it exudes from the bark. Being more elastic than other gums it is used in England to improve the quality of gutta-percha, and in the United States to give elasticity to chewing gums. It is produced in United States in the southern Keys of Florida.

Chicopee, Chik' o pe, Mass., a city of Hampden Co., 4 m. n. of Springfield, on

the east bank of the Connecticut River, at the mouth of the Chicopee, and on the Boston & Maine and the Boston & Albany branch of the New York Central Railroad. It is connected with Springfield and Holyoke by electric railway lines. The former villages of Fairview, Chicopee and Willimansett are now included in the boundaries of Chicopee City. The Chicopee River affords abundant water power for a variety of manufactures for which the city is noted. The products include cotton and knit goods, carpets, firearms, automobiles, athletic goods, agricultural implements, bronze statuary, swords, rubber tires and knitting machines and needles. Chicopee was settled about 1675, incorporated in 1848 and received a city charter in 1890. Population in 1920, 36,214.

Chicory, *Chik' o ry*, or **Succory**, a plant of the Composite Family closely related to the dandelion and salsify. It grows wild in many parts of Europe, Asia and northern Africa, and in some places is a pleasing roadside plant. It is best known, however, as a plantation or farm product, being used as a food and in making a drink resembling coffee.

The stems of the chicory are leafy and have milky juice; they grow to a height of two feet or less and have a feathery appearance due to their many much-divided leaves. The flowers are generally blue, but may be white or pink and are clustered in a leafy cup which opens to disclose them only upon cloudy days and then only in the morning. Each little blossom has a flat, notched strap at its summit, and ends in a sheathlike tube from which the stamens and pistils protrude. The fruit grows in a queer little cup and is of no value except for seed. The leaves are used for salads, and the root, which is thick and fleshy, is dried, roasted and ground and used in place of, or as an adulterant for, coffee. Much chicory is produced in Belgium and also in the United States, where a species, called endive, is used in the same ways as lettuce.

Chicoutimi, *She"koo"te"me'*, a city of Canada in the Province of Quebec, at the

junction of the Chicoutimi and Saguenay rivers, and on the Quebec & St. John Railway, 220 m. n.e. of Quebec. The city is at the head of the river steamship navigation, and is noted alike as a summer resort city and industrial center, particularly in the manufactures of pulp, of which 60,000 tons are exported annually to Great Britain. The name of the city and river is of Indian derivation, meaning deep water. Among the important buildings are the Roman Catholic Cathedral, Church of Eudist Fathers, a college, a sailors' hospital, convents and hotels. The leading industrial establishments include lumber, planing and grist mills, tanneries, factories for the manufacture of cheese, carriages, furniture, sash and doors, a creamery and machine shops. Population 8,937.

Child, Lydia Maria (1802-1880), an American author, born in Medford, Mass. After studying in the academy in her native town she became a teacher and published *Hobomok*, her first novel, in 1821. Seven years later she married David Lee Child, a brilliant Boston journalist. In 1833 appeared *An Appeal for That Class of Americans Called Africans*, said to be the first anti-slavery book written by an American. It was a powerful plea for abolition and won many converts. From 1840 to 1844 she and her husband edited the *Anti-Slavery Standard* in New York City. Later she wrote on philanthropy and Indian rights and published miscellaneous and children's books. Among her works are *Philothea*, *Isaac T. Hopper: A True Life*, *The Frugal House-wife*, *The Progress of Religious Ideas Through Successive Ages*, *Miria: A Romance of the Republic* and *Aspirations of the World*.

Child Labor. The industrial training of children was provided for in England by the Elizabethan Poor Law of 1562, when arrangements were made for the apprenticeship of orphans and children of the lower classes to a trade. Throughout the 17th and 18th centuries the expediency of this wholesale apprenticing of children without regard to age or physical condition, had remained unquestioned, and at the end of the 18th century the situation in respect to child labor and the demands made on the

health and strength of the children had assumed an inhuman, even revolting, character. The industrial revolution of England at the end of the century did away with the apprentice system, but the introduction of machinery in no wise lessened the evils. Cheap child laborers were in constant demand in factories. Children were set to work under the most inauspicious conditions; in unsanitary environment, for excessive hours and without sufficient protection against injury.

Epidemics breaking out among factory workers from time to time drew the attention of the public to the miserable situation, and various attempts at reform were inaugurated. In 1796 the Manchester Board of Health, after due investigation, indicated ways in which sanitary conditions might be improved, but failed to provide means of enforcing any laws. The first factory act was passed in 1802, and its restrictions controlled factory sanitation in general, as well as the length of the work day. Again, proper enforcement was not provided for. Robert Owen, the great manufacturer, was instrumental in bringing about the passage of a second bill in 1819. Children under nine years of age were excluded from labor in factories and the length of the work day was limited to 12 hours. A third act followed in 1833, and during the next decade violent opposition was maintained against the treatment of children working in textile factories. Gradually the hours of labor were limited to nine a day for children under 11 years, and three additional hours per day for persons under 18.

From 1840, child labor legislation became constantly more effective, and was directed toward protection of persons working in mines and industrial establishments in general, as well as of those in textile factories. The different laws were consolidated in the act of 1878, and practically the same principles were reiterated in the act of 1901. Among important provisions included in these acts are: age of permissible employment; enforcement of safety, such as fencing in of

dangerous machinery; control of out-work; and sanitation in factories. The acts of 1906 and 1907 only make these provisions more secure and impose further limitations on child labor.

The history of child labor legislation in the United States differs in no radical way from that of England. Similar existing evils have brought about the demand for similar reform. Massachusetts was the first state to secure effective regulation of child labor. In 1842 the length of the working day for children under 12 years was limited to 10 hours. The law of 1866 required an age limit of 10 years before a child could be legally employed; school instruction through six months of the 12 for children between the ages of 10 and 14; and the limit of an eight-hour day for children under 14 years working in manufacturing establishments. Proper fines provided for the enforcement of the law. By 1877 the laws of Massachusetts were as inclusive in their provisions as were those of Great Britain.

At the present time every state in the Union has some kind of child labor law. The Federal Tax on Employment of Children which went into effect in 1919 practically prohibits the employment of children under 14 in mills, factories and canneries, and under 16 in mines and quarries. The age minimum for employment varies in different states, the general tendency being toward a 14-year minimum, but this is lowered in many cases by specified exemptions. Nearly three-fourths of the states restrict the working hours of children to 8 hours a day and over three-fourths prohibit the employment of children at night; but in only about half of these states do these provisions cover all gainful occupations.

Child Study, the term applied by educators to the scientific study of children. It includes those parts of biology, physiology and psychology which pertain directly to the physical and mental development of children. The most advanced stages of child study require laboratories equipped with costly and delicate apparatus, and expert training on the part of

the investigator. These laboratories are found in teachers' colleges and a few state normal schools, Clark University, Columbia University and the University of Chicago.

There is, however, an elementary stage of child study in which anyone interested in children can participate and in which apparatus is not necessary. This includes the observation of children for the purpose of ascertaining: (1) the normal development of the senses; (2) the general state of health; (3) the child's interests; and (4) the order in which the mental powers develop. Any teacher or parent can pursue this line of study very much to the child's advantage. While a guide is not absolutely necessary in pursuing these investigations, it is very helpful. Among the most useful books for this purpose are Taylor's *Study of the Child* and Lamoreaux's *The Unfolding Life*.

Child study reveals the intimate connection between mind and body, shows the order in which the mental powers develop and gives one a better understanding of the adolescent period. Among educators it has resulted in radical changes in courses of study and methods of teaching and discipline, so that the subject matter and the method are now adapted to the child in each stage of its development. The harsh measures of discipline have been replaced by methods that lead the child to form high ideals and to the development of all his powers.

Child study had its beginning in Germany, where it has reached the most advanced stage of development. It was introduced into the United States in 1880, and now has a place in the course of study in practically every school for the training of teachers. The public schools in a number of large cities engage one or more experts, who devote their time to the welfare of the pupils and to seeing that the principles of child study are applied by the grade teachers. Consult Preyer, *Mental Development of the Child*; Baldwin, *Mental Development*.

Chile, *Che' la*, or *Chili*, *Chil' e*, a re-

public of South America, occupying the western slope of the continent, between 17° 57' and 55° 58' 40" south latitude. The total length from north to south is 2661 m. and the width varies from 68 to 250 m., the average width being about 87 m. The area, inclusive of the islands occupying the southern coast, is officially computed at 289,796 sq. m.

SURFACE, RIVERS AND LAKES. Near the coast is the region occupied by the mountain range known as the Coast Cordillera, and almost invariably the coast line rises abruptly from the sea. The highest points reach an elevation of about 3300 ft. In the northern part of the country is a fairly level plain which rises to meet the Bolivian Plateau. Among the volcanoes of this section is the Llulailaco; they are separated from one another and there is here no continuous range. South of this plain are transverse cordilleras which form the boundaries of the river valleys, and still farther south is a central valley about 600 m. in length. South of Puerto Montt the cordilleras extend as far as the sea, and the country is generally mountainous, with only a valley lying east of the range between the high elevations and the watershed between the two oceans. The rivers have their sources in the Andes and after a short course flow straight to the sea. The principal streams are Loa, Sama, Copiapó, Coquimbo, Ligua, Maipó and the Bio-Bio. The lakes are numerous, and as they are fed from the melting snows they are dry a large part of the year. They are used extensively for steamship navigation, where this is possible, and drain generally westward to the Pacific through short river channels.

CLIMATE. The climate of Chile is oceanic, or insular, and the central part does not suffer from extremes of temperature. In the north, tropical and arid conditions prevail and in the southern part the rainfall is excessive. The sea breeze of the coast becomes violent on the heights of the Andes; along the southern coast are the strong westerly winds which blow at all the seasons of the year.

AGRICULTURE AND MINING. In the large central valley of Chile the agricultural interests predominate. Here are found the large estates owned by the wealthy classes that exert a powerful influence in the government of the country. The principal crops are wheat, barley and maize, and among the fruits the apple and the grape are in the lead. The cereals once formed a staple export both to California and to Europe, but they have declined considerably in importance. The vine culture is significant and over 93,000 acres are devoted to grape production. The national beverage, however, of the people is the *chicha*, made from Indian corn. Flax, hemp, tobacco, potatoes and peas are grown and among the European fruits that have been introduced, the apple has met with the most successful growth. The mild winters are favorable for the existence of pasture the year around, and cattle raising is a prominent industry. The minerals of the country are among the most important of the continent. Formerly it was known chiefly for its large output of copper, but recently nitrate mining has developed so rapidly that Chile leads the world in the supply of that mineral, obtained principally from the Province of Tacna, once a province of Peru. Among other ores yielding significant returns are gold, silver, manganese, lead, cobalt, vanadium and guano. There is but little mining of iron, and the coal deposits are limited almost entirely to the Province of Arauco and Concepcion.

MANUFACTURE, COMMERCE AND TRANSPORTATION. The natural bent of the inhabitants, like that of most Spanish Americans, is not toward manufacturing interests, and the industries are as yet undeveloped. The foreign element is not sufficiently strong to exert a marked influence in this direction. Breweries, distilleries, sawmills and tanneries are found in the southern part of Chile, principally in Valdivia, and the manufactures also include soap, shoes and furniture. Manufactured articles make up the bulk of the import trade, which also includes many other necessities and luxuries of

life. The exports are devoted in the main to mineral resources, these products constituting about 85 per cent of the total value of the exports. The main port for imports is Valparaiso; for exports, Iquique. The transportation facilities are among the best in South America; the construction of railway lines, begun as early as 1852, was increased to an extensive scale and controlled by the state in 1888. The mileage now is approximately 5000 m., of which about half is operated by the government. There are numerous telegraph and telephone lines that are freely used, due to the poor condition of the roads. The ports carry on an active shipping trade, and the merchant marine, not including vessels under 50 tons, numbers about 150 vessels. Six lines maintain steamship connections with Europe, and the carrying trade is mainly British, German and French.

GOVERNMENT. The government of Chile represents a centralized republic, under the provisions of the constitution of 1833, amended in 1888, 1890 and 1892. The powers of government are vested in the three branches, the legislative, executive and judicial. The National Congress, exercising the legislative function, consists of two houses, the Senate, composed of 32 members, and a Chamber of Deputies of 94 members, or one deputy for every 30,000 of the departmental population. Congress convenes between the first of June and the first of September every year. The chief executive is a president elected for five years and ineligible to serve the succeeding term. Six ministers are his executive advisers, and they exercise control over the following departments: interior, foreign affairs, worship and colonization, justice and public instruction, war and marine, finance, industry and public works. A council of 12 members has further advisory functions and approves numerous executive appointments and acts. A Supreme Court of Justice, consisting of seven members, exercises judicial power over the law courts of the country. One or more judges hear all trials and the jury system is unknown.

EDUCATION AND RELIGION. Public instruction is free, but is still unsatisfactory, despite repeated efforts among the progressive element to improve its methods and extend its influence. It is controlled by the National Government, and the minister of justice and public instruction directs all educational matters from the remote primary school to the university. The National Institute at Santiago constitutes the leading high school of the secondary grade in the country. The national university is at Santiago. The religion of the state is the Roman Catholic faith, protected by the president under his inaugural oath, and so declared by the constitution. A liberal interpretation alone of the constitution permits the public exercise of any other religious faith. The priests have great influence both in matters of religion and political interest.

INHABITANTS. The native population is of mixed or pure Indian origin, with about one-fourth of the total of pure Spanish origin. The foreigners are represented by the following nationalities: Spanish, French, German, English, Italian and a very small per cent from the United States.

HISTORY. The northern part of the country was originally occupied by the Incas, who were conquered by the Spaniards in 1550. The Araucanians, who occupied the southern part of the country, resisted for over 200 years longer and were never fully conquered. Chile was a possession of Spain until 1818, when the country gained its independence. Independence was not formally recognized by Spain, however, until 1844. In 1865 Chile engaged in war against Peru, and in 1879 in a war against Peru and Bolivia she added Antofagasta and Tarapaca to her territory. Population, estimated at 3,754,723.

Chillicothe, Chil'i koth'e, Ohio, the county seat of Ross Co., on the west bank of the Scioto River, 42 m. s. of Columbus and on the Baltimore & Ohio, the Norfolk & Western, the Cincinnati, Hamilton & Dayton and other railroads. Shops of the Baltimore & Ohio Railway are lo-

cated here, and the city also has several large paper mills. It is in the center of a large agricultural region and has an extensive trade in grain and coal. The city has two parks, and nearby are a number of ancient mounds. Population in 1920, U. S. Census, 15,831.

Chimæra, Ki me'ra, in myths, a fire-spitting monster with the head of a lion, body of a goat and tail of a dragon. It devastated Lycia until it was killed by Bellerophon. See **BELLEROPHON**.

Chimborazo, Chim"bo rah'zo, a mountain of Ecuador once mistakenly thought to be the highest peak of the Andes. It rises 12,000 ft. above the city of Quito, 90 m. distant, and 20,500 ft. above the level of the sea. Chimborazo is an extinct volcano, and its summit is crowned with glaciers that are visible from the Pacific and add to the imposing beauty of its rugged slopes.

Chim'ney Swallow. See **SWIFT**.

Chimpan'zee, an anthropoid, or man-like, ape of the Simian Family. Mentally the chimpanzee is supposed to be nearer man than are any of the other apes, although physically it ranks second in point of likeness. Chimpanzees are found only in tropical Africa, and their name is an Anglicized form of the native name, which signifies a low order of man. Its skeleton is practically the same as that of man, but the spinal column has only one curve, and this prevents the animal from maintaining an upright position. The chimpanzee ordinarily travels on "all fours," but instead of resting upon its palms the fingers are curled under and the knuckles of the hands are upon the ground. Possibly a reason for this is that the tendons of the palm are shorter than the bones of the fingers, hence the fingers must always be held curled. The arms are used like crutches, between which the chimpanzee swings its body in an awkward manner and often with such force that it falls backward. It is a wanderer in habits and does not, as many suppose, build a permanent abode to which it frequently returns. It does, however, occasionally lay a bed of

boughs on the limbs of trees, upon which its family may sleep.

When young, the chimpanzee is active and teachable, fond of toys and eager for games and sport. R. L. Garner, who spent four months in a cage in the depths of an African jungle, studied the speech and habits of many chimpanzees. By means of phonographic records he has made some interesting experiments in regard to what he calls their language, which he says is made up of some 12 to 20 words or sounds. The average length of the chimpanzee's life is from 20 to 24 years, but individuals have been known to live 40 years.

The diet of the chimpanzee consists chiefly of fruit and nuts, but this ape can be educated to an enjoyment of human food. The brain, compared with that of man, is small and is rarely more than 27 cubic inches in volume. Chimpanzees live in families generally consisting of some four or more individuals. The young stay in the group until six or eight years of age and are treated with care and tenderness. Interesting but differing accounts of the chimpanzee are given by Ernest Ingersoll in *The Life of Animals, Mammals*; and by R. L. Garner in *Apes and Monkeys*. See APE.

Chi'na, until 1912, a great empire of Eastern Asia comprising China Proper, with its 18 provinces, and the dependencies of Manchuria, Mongolia, Tibet and Chinese Turkestan. This vast territory of 4,277,170 sq. m. is larger by 1,000,000 sq. m. than is the United States, and in size is exceeded only by the British Empire and Russia and by France with her colonies. This region is bounded on the n. by Asiatic Russia; on the e. by Korea, now a Japanese possession, and by the Japan Sea, the Yellow Sea and the East China Sea, all arms of the Pacific Ocean; on the s. by India and Indo-China; and on the w. by India and the southern Russian provinces. By the Chinese their country has been known as the Middle Kingdom and the Flowery Kingdom, while to the English, after the times of Marco Polo, it was long known as Cathay.

The chief interest both historically and politically centers about China Proper, the southeastern division of the country, and it is that section which is treated in the following paragraphs. For information relating to the dependencies, see MANCHURIA; MONGOLIA; TIBET; CHINESE TURKESTAN.

AREA, PHYSICAL CONDITIONS, ETC. China Proper comprises about one-third of the old Chinese Empire and has an area slightly greater than that of all the states east of the Mississippi. Within its limits dwell one-fifth of the inhabitants of the world, all united under the same laws and government and making a people of the greatest unity of language and customs. Physically, China Proper is divided into three regions: the great plain of the north, which stretches from Peking south to Hangchau Bay and inland for about 300 or 400 m.; the mountainous region of the west; and the hill country of the south and southeast. Aside from these there is a region of disconnected river basins and table-lands lying between the rugged mountain ranges and forming the most fertile section of the country. The soil of northern China is largely made up of a fine powdery substance known as loess (See LOESS), which sometimes reaches a depth of several thousand feet. In some localities it has been carved by the winds and rain into terraces and gorges of great beauty.

China has many great rivers, chief among which are the Hoangho in the north, the Yangtse-kiang in central China and the Si in the south. These and their tributaries form the great natural waterways of the country. See HOANGHO; YANGTSE-KIANG.

CLIMATE. In a country of so great an area the climate and the productions must necessarily be varied. In the five northern provinces the extremes of heat and cold are great. In winter the ice forms so thickly upon the rivers as to render navigation impossible, but in mid-summer for a brief period the heat is almost unbearable. Grains and fruits such as are found in northern Europe are

raised, some minerals are mined and much valuable timber is cut. South of these provinces lies the most productive region. It occupies the eight central provinces and is the region of the tea plant and the silkworm. Cotton is also a great crop, and in the eastern part the great mills manufacture the cotton and silken goods for which China has long been noted. The land not devoted to the production of these three crops is sown to the grains that feed the people of the thickly populated region.

The five southern provinces are tropical in climate and production. Here are the vast rice fields, and here too are fields of yams, tobacco, sugar cane, sweet potatoes, ground nuts and opium poppies. Bananas, oranges and mangoes are raised in sufficient quantity to supply the entire Chinese demand. China's chief exports are raw and manufactured silk, tea, beans and bean cake, raw and waste cotton, sesamum seed, vegetable oils, skins and furs, and straw braid. Aside from these, some of her characteristic products are the tallow tree, varnish tree, camphor tree, bamboo, ramie or boehmeria, ginseng and flowers of the greatest variety and beauty. The majority of the cultivated flowers of the world are said to be of Chinese origin.

AGRICULTURE. The problem of feeding the great and ever-increasing population of China has been no small one, and agriculture has necessarily long been the chief occupation. The fact that over 400,000,000 people are supported upon an area smaller than the improved farm lands of the United States and on land that has been tilled for 4000 years tells in itself that the Chinese have practiced intensive and conservative farming. It was fully 4000 years ago that the great system of canals, which is now so complete as to drain and to irrigate in a remarkable way all of the available farm land of China, was begun. In China and Japan together there are more miles of canal than would be included in 40 canals across the United States from east to west, and 60 from north to south. Though the methods of tilling the soil

seem primitive, the results accomplished are little less than marvelous, when one recalls that already much of the farm land of eastern United States is said to be worn out.

MINERALS AND MINING. China is known to be rich in minerals, but the crude methods of obtaining them and the difficulty of reaching many of the fields have made the output small. Coal, iron, copper, lead, tin, mercury, gold and salt will probably be found in abundance when modern methods of locating and securing them are introduced. China clay, kaolin and potter's earth supply the porcelain manufactories of entire Asia. Jade, a highly valued stone, is found in the southwestern provinces.

PEOPLE. The Chinese are a people belonging to the Mongolian race. Their origin is unknown, the speculation concerning their migration from India, Egypt or Babylonia having practically no foundation. The pure Mongol type is rare. Their stature is low, five feet four inches being above the average, and their hands and feet are small. The hair is coarse and black, the eyes are almond-shaped, the iris is black, the cheek bones are prominent, the nose is short and flat, and the complexion varies from a yellow to a dark brown. They live simply and at small expense. They are industrious and polite. It is difficult for the Western mind to appreciate the Oriental temperament. Instead of desiring to progress, the Chinaman has always preferred to follow the customs of his ancestors; thus many occupations are carried on by the same methods used thousands of years ago. In fact the introduction of new processes and of modern machinery has been looked upon with disfavor, as evincing a disrespect for the ways of past generations. The Chinese are an educated people and have great respect for learning, but they make little practical use of their knowledge. Though they are credited with the inventions of gunpowder, the compass, printing and weaving, they have made but little use of these in their daily occupations. Until recently women were not permitted the advantage of edu-

TRAVELERS IN CHINA SEE NOVEL SIGHTS



HUMAN POWER IS CHEAPER THAN ANIMAL POWER



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THIS FAMILY PREFERS CHOP STICKS TO KNIVES AND FORKS



A CHINESE PRAYER WHEEL
"Select a prayer, and turn the wheel."

cation, although among the wealthy classes they led a comparatively easy life. They were richly dressed but given few liberties. During the recent years foot-binding has been discontinued and the men have been allowed to cut off their queues.

Taoism and Confucianism are the principal forms of religious belief and were both founded by Chinese teachers (See CONFUCIUS; TAOISM). Christianity, introduced by Western missionaries, and Buddhism, brought in from India, have attained large followings.

LITERATURE. See LITERATURE, sub-head *China*.

HISTORY. Chinese history dates back thousands of years and is separable from legend as early as 2700 B. C. During what is known as the Tsin dynasty the Great Wall was built to protect the country from the invading Tartar hosts. The history of the Chinese Empire, as it exists up to 1912, began in the 13th century, when the Mongols took possession of the empire and Kublai Khan gave to China a dignity and splendor never before attained. In 1644 the Manchus were invited across the border to aid in driving out the rebel hordes that were threatening the government. When they had accomplished this task, they remained as rulers of the country and founded the dynasty, which came to an end only with the fall of the empire after three centuries of power. It was these Manchu rulers who made compulsory the wearing of the queue. During the greater part of this time China was a closed country desiring little intercourse with the outside world. Opium, the chief import, was not a desirable commodity, and an attempt to suppress its importation brought on the Opium War (1839-1842) with England; though the war itself was an unjust one, it opened the ports of Canton, Shanghai, Ningpo, Fuchau and Amoy to foreign trade and gave Hongkong to Great Britain. Since then many countries, notably China and Portugal, Russia and Japan, secured footholds on Chinese territory. Japan and China came to open warfare over Korea in

1894, and after a year's struggle China was forced to cede Formosa and certain disconnected parts of Liaotung Peninsula to the victorious Japanese.

Concessions to other foreign powers brought on, in 1900, the Boxer uprising, which threatened the lives of the foreign inhabitants and gave indication of the unsettled state of the country and the uncertainty of the government. The United States, Great Britain, Russia, Japan and France immediately sent troops into China to protect their legations, missionaries and other subjects. By this means a temporary peace was restored, and China was required to pay an indemnity to those nations whose subjects had suffered at her hands; the United States, however, later forgave her part of the debt. The foreign powers, with the exception of Russia, withdrew their troops, and China was left to work out her own development, though keenly observed by other nations. During the Russo-Japanese War China sided with Japan, even aiding her troops in the field, and at the close of the war both Russian and Japanese troops vacated Chinese territory.

The Republic. During these years two opposing parties of China had been striving for power, and the strength of the reactionaries had long prevented the entrance of modern methods and of an improved form of government. The Emperor Kwang-su died in 1908, and the Dowager Empress, who had been the controlling power in matters political and social, did not long survive him. P'u-yi, the successor to the throne and nephew to the preceding Emperor, was but little over two years of age when he came to the throne, Nov. 14, 1908. His father, Prince Chun, acted as regent. As early as 1907 definite steps had been taken toward the formation of a Parliamentary form of government, and commissions had been sent to various constitutional governments to report on their methods. In 1908 an imperial edict was issued, which outlined a system of government and provided for a Parliament which was to be established within nine years.

On Dec. 29, 1911, a provisional convention elected Dr. Sun Yat-Sen president of the republic (See SUN YAT-SEN.) On Feb. 12, 1912, the infant monarch, the last of the Manchu line, was forced to abdicate. Dr. Sun Yat-Sen resigned and Yuan Shih-Kai took the oath as second provisional president. In October, 1913, he was elected first permanent president by the Parliament. Owing to differences between Yuan Shih-Kai and Parliament over the constitution he expelled from that body all members of the opposition (the Nationalist Party) and later dissolved Parliament, the government being then carried on by the president, vice-president and an Administrative Council of 71 members. An uprising was put down and the government sustained. See YUAN SHIH-KAI.

Chinch Bug, an exceedingly injurious insect of the Lygaeid Family. It is found in all parts of the United States and Canada, but is best known in the corn- and wheat-growing districts. The chinch bug is rarely more than one-sixth of an inch in length, and may be known by its black body, nearly transparent forewings, marked with one black spot each, and its long, hairy antennæ. The larvæ of the chinch bugs are red, with grayish markings, and are known as red bugs. They may be found early in the spring and begin work at once on the growing wheat fields. In six weeks they become mature and are ready to attack the corn. At least two generations appear each season.



CHINCH
BUG

Aids in exterminating this pest are: the gathering and burning, in the fall, of the rubbish in which the beetles might hibernate; plowing a deep furrow around the field and filling it with coal tar or crude petroleum to prevent their entrance; or introducing their natural enemies, the ladybird beetle, or ladybug, the parasitic fungus which kills them readily, and beetles infected with chinch bug cholera. These last methods, though helpful, are not so effective as was once supposed. The United States

Department of Agriculture has issued bulletins on methods of extermination which will be sent from the department upon request.

Chinchil'la, a Rodent of the Chinchilla Family, related through structure to the Porcupines, but in outward appearance more nearly resembling the Rats. The chinchillas live in large burrows in the highest Andes and whole families remain together. They are timid, defenseless creatures and are valuable because of their soft, gray fur, which is of great commercial value. The chinchillas may be domesticated and are said to become interesting household pets.

Chincho'na. See CINCHONA, *Sin-ko'na*.

Chinese Exclusion Act, an act passed by Congress in 1882 excluding Chinese laborers for a period of ten years. A similar act had passed Congress in 1879 in response to popular demand, but was vetoed by President Hayes because it violated a treaty made with China in 1868. The sentiment against this class of the Chinese was aroused because of the coming of such great numbers to the Pacific coast, where the low wages which satisfied them, their standard of living and their habit of returning to China with their hoarded savings seemed detrimental to American laborers and American standards. The act of 1882 was amended in 1888, with the idea of making the conditions of the act permanent. In 1892 the Geary Law, which was amended slightly in 1902, compelling the Chinamen already in the United States to secure certificates of residence and continued the exclusion of Chinese laborers until 1912.

Chinese Turkestan, *Toor'ke stahn'*, or **Eastern Turkestan**, a dependency of China located in the western part. It is bounded upon the n. and e. by Mongolia, on the s. by Tibet and on the w. by Russian Turkestan. To the Chinese it is known as the Province of Sinkiang; its area is 554,340 sq. m., or a little less than that of Alaska. The Thian Shan Mountains enter the western part of the province, but the river basins of the central

IN THE OLDEST COUNTRY ON EARTH.



A street scene in Peking.



THIS IS THE LIFE IN CHINA.

Many millions make their homes on the rivers, all of which are much congested.



P. & A. Photo

Recent dispatches from China tell of a project to construct an automobile road on the great wall of China. This road would be hundreds of miles in length. Above to the left is a panoramic view of the wall. The smaller view is a close-up of a section of the wall.

CHINOOK

and eastern sections are fertile and quantities of grains, vegetables and fruits are raised. Mulberry orchards are common and much silk is produced. Horses and camels, both wild and domestic, are found in great numbers, and stock raising is one of the chief branches of agriculture. The country lies in the path of the great caravan routes to east and west and carries on an extensive trade with Tibet, China, Kashmir and the Russian Empire. The people of Turkestan are of mixed races, but chiefly Ural-Altaic stock. They are an industrious people and skillful in trade. The capital of Eastern Turkestan is Kashgar, and its population is 1,200,000.

Chinook', a local name for a warm, dry wind which blows over parts of the Rocky Mountains in the United States and Canada. The name was given by the early settlers of the Northwest Territory in the belief that the wind came from the country occupied by the Chinook Indians. The wind is a descending current which becomes warmed by compression at the rate of about 1° F. for each 183 ft. of descent. In parts of the Rockies where it descends several thousand feet, the rise in temperature is not infrequently 30° F.; and as its passage over the mountains has robbed it of its moisture, it readily evaporates the snows on the slopes, making these areas habitable for stock which graze there throughout the winter. The dry, hot winds of Kansas and Nebraska probably originate in the same manner. A similar air current called the *föhn* sweeps over the Swiss Alps.

Chinquapin, *Chin' ka pin*, a shrub or small tree of the Oak Family, closely related to the chestnut and like the chestnut producing a sweet, edible nut. The trunk, which is somewhat furrowed, is slender and rarely attains a circumference of more than seven feet. The leaves are long and pointed at both ends and have slightly spiny margins. Both surfaces are smooth but the lower is paler than the upper. The flowers are in long, yellow catkins, which appear in summer after other trees have ceased to

CHIPPEWA FALLS

bloom. The fruit is a nut surrounded by a spiny bur which bursts in September, disclosing the small, round seed which is borne singly in the bur. The nut is sweet and of excellent flavor. Chinquapin trees grow in the United States from Pennsylvania west and south to Texas. The lumber is used for posts and the nuts are sold on the market in the late autumn.

Chip'munk, a lively little ground squirrel known throughout the United States and a familiar worker along the summer and autumn roadsides. It is of reddish-brown color, having five buff stripes along its back. Its tail is long and slender and its body is trim built. As it skips along the tops of fences or over stone heaps it keeps up a constant chipping noise, which calls attention to itself. The home of the chipmunk is a many-galleried burrow where nuts and grains are stored for winter use. Like all squirrels it is inquisitive and active, defending itself only by flight or by a bite from its sharp teeth. It is not readily domesticated but does not hesitate to approach human beings, if they remain quiet. The weasels are its worst enemy and not only seek it in the wood but pursue it to its burrow.

Chippewa, *Chip'e wah*, **Battle of**, an engagement of the War of 1812, fought July 5, 1814, at Chippewa, Canada, between Americans under Gen. Jacob Brown and British under General Riall. On July 3 the former's advance troops, under Scott and Ripley, had appeared before Ft. Erie, which surrendered without a struggle. Proceeding northward along the Canadian side of the Niagara River, Scott overtook the British at Chippewa, where a sharp engagement took place, which resulted in a brilliant victory for the Americans. The British lost 604 men; the Americans, 355.

Chippewa Falls, Wis., a city and the county seat of Chippewa Co., 12 m. n.e. of Eau Claire and 100 m. e. of St. Paul, Minn., on the Chippewa River and on the Chicago, Milwaukee & St. Paul, the Soo Line, the Chicago & North Western and other railroads. An elec-

tric line connects it with Eau Claire. Chippewa Falls is noted for its mineral springs, the waters of which are shipped to all parts of the United States and also to foreign countries. The city derives good water from the river and manufactures gloves, shoes, woolen goods, beet sugar, flour, lumber, woodenware and foundry products. In Chippewa Falls are located the Wisconsin State Home for the Feeble-Minded and the Chippewa County Insane Asylum. There is a fine county courthouse and a public library. The first settlement on the site was made in 1837; the city received its charter in 1870. Population in 1920, U. S. Census, 9,130.

Chip'peway. See OJIB'WAY.

Chiron, Ki'ron, wisest and most just of the Centaurs, was a pupil of Apollo and Diana, from whom he learned hunting, medicine, music and prophecy. In his turn he educated Æsculapius, Jason, Hercules and Achilles. While contesting the Centaurs, Hercules accidentally shot him. Chiron could not die, for he was immortal, but Jové ended his sufferings by making him the constellation Sagittarius. See CENTAUR.

Chiropractic, kiropractic, a system of manipulations that aims to cure many diseases by adjusting the articulations of the body, especially those of the spine. It is claimed that slight displacements of the spinal segments are frequent and that such displacements compress, to some degree, the pair of spinal nerves that pass out between the vertebra of the cord at that point. And it is further claimed that as a result the organs or glands served by that pair of nerves can not function properly and various physical ills soon show themselves.

Chiv'alry, a military institution of the Middle Ages, whose members, called knights, were pledged to protect the Church and to defend the weak and oppressed. For the origin of chivalry we look back to the body of horsemen created by Charles Martel to repel the raids of the Arabs into southern France. From here the system spread all over Europe. Chivalry was the military side of the de-

velopment of feudalism, having no connection with land ownership. The religious spirit of the age entered largely into the system, and during the Crusades certain military orders of monks, like the Knights Templars, came into existence. The education of the knights of chivalry began when they were seven and lasted until they took their vows, at the age of 21. The essential virtues of each knight were gentleness, courage, courtesy, honesty, purity, generosity, hospitality and loyalty to the cause of religion and to his companion knights. All of the events of the latter half of the Middle Ages were colored by the system of chivalry and the literature of the period shows how its spirit influenced the life and thought of medieval Europe. The fall of chivalry was effected by the same forces that caused the overthrow of feudalism. *Don Quixote*, a Spanish novel of the 17th century, is a satire on the absurdities of the popular romances of knighthood. See FEUDAL SYSTEM; DON QUIXOTE.

Chloral, Klo'ral, a chemical substance formed by the action of free chlorine gas upon aldehyde, or by passing chlorine gas through alcohol and, from the chloral alcoholate thus formed, setting free chloral by means of sulphuric acid. Chloral is ordinarily a colorless liquid which combines readily with water to form the chloral hydrate commonly but wrongly known as chloral. In this form it is a crystalline solid used medicinally to quiet the nervous system and produce sleep. Overdoses cause poisoning which should be treated with stimulants and by establishing artificial respiration. Like all drugs of this sort it should be used only under the directions of a physician.

Chloride, Klo'ride, of Lime, or Bleaching Powder, a compound used for whitening linen, cotton and woolen goods, and produced by passing free chlorine gas over slaked lime. The lime is spread upon the stone floor of the bleaching room in furrows, and the room is tightly closed. The gas is then admitted and the action is watched through

tight windows. As the chlorine acts upon the surface, the furrows are raked over by means of specially prepared wooden rakes. This process consumes about 24 hours. When the lime has been entirely acted upon by the gas, a dust of finely-pulverized lime is showered through the room to absorb any remaining chlorine, which would poison the air and render it unfit to work in.

Chloride of lime was once supposed to be a mixture of calcium chloride and calcium hypochlorite, but has since been proved to be a chemical compound with individual chemical properties.

Materials to be bleached are first steeped in a diluted solution of bleaching powder and then in a diluted solution of hydrochloric acid. By this means free chlorine is generated, which is the true bleaching agent. Bleaching powder is easily decomposed in the presence of air and is very useful as a disinfectant and germicide.

Chlorine, *Klo'rin*, a yellowish gas, rarely found free in nature because of the readiness with which it unites with other elements. It has a suffocating odor and if inhaled pure causes death; even diluted with air it is irritating to the nose and throat and produces inflammation of their linings.

Chlorine was discovered by Scheele in 1774, and its characteristics were defined by Davy in 1809. It is found most plentifully in combination with sodium, potassium and magnesium in sea water and mineral springs. Its compound with sodium is sodium chloride, or common salt. Free chlorine is prepared for commercial purposes by the separation of salt into its two elements.

Its strongest characteristic is its great affinity for hydrogen, with which it combines with great force in the sunlight, less actively in diffused light and not at all in the dark. The compound of hydrogen and chlorine is called hydrochloric, or muriatic, acid, and is one of the most common acids (See MURIATIC ACID).

Chlorine is used commercially as a bleach for organic dyes, being applied in the form of chloride of lime. It is also

used as a disinfectant because it stops bacterial growth and destroys unpleasant odors.

Chloroform, *Klo'ro form*, a heavy, colorless liquid, best known from its use as an anæsthetic. It has a pleasant, sweetish odor and taste and is soluble in alcohol and ether. Its chemical constituents are carbon, hydrogen and chlorine. It is formed when chlorine gas is passed through marsh gas in direct sunlight, but is commercially prepared by the mixture of alcohol or acetone with bleaching power and slaked lime. Chloroform, when inhaled in small quantities, deadens pain. In larger quantities it is used by physicians and surgeons to produce unconsciousness in surgical cases, and is considered a safe anæsthetic, since it is estimated that only one case out of 3000 is fatal. Ether, which is even safer, is, however, more frequently used in the United States. Chloroform is also used externally to ease local pain.

As a chemical compound it was discovered by Liebig and Guthrie separately in 1831 and was first used as an anæsthetic by Simpson of Edinburgh in 1848.

Chlorophyll, *Klo'ro fil*, the coloring bodies of the leaf, in which, under the action of sunlight and air, carbonic acid gas, hydrogen and oxygen are converted into starch for the nourishment of the plant. Plants deprived of sunlight gradually lose their chlorophyll bodies and become practically colorless.

Choate, *Chote*, Joseph Hodges (1832-1917), an American lawyer and diplomat, born at Salem, Mass. He studied at Harvard University and settled in New York, practicing law in association with W. M. Evarts. His ability and sound judgment brought him quick recognition; and he achieved considerable fame through the defense of Gen. Fitz-John Porter, his prosecution of the Tweed Ring, and in connection with the income tax cases before the Supreme Court. In 1894 he was chairman of the convention held in New York on constitutional revision; and he was counsel for the United States in the Bering Sea dispute. Mr. Choate was the United States ambassa-

dor to Great Britain in 1899-1905. In 1905 he returned to New York and again took up the practice of law.

Choate, Rufus (1799-1859), an American statesman and orator, born in Ipswich, Mass. He graduated from Dartmouth College in 1819, studied law and was admitted to the bar in 1823. He served in Congress from 1830 to 1834, at which date he removed to Boston and quickly took foremost rank as an advocate. In 1841 he succeeded Daniel Webster in the United States Senate when the latter became secretary of state under President Harrison. Upon Webster's return to the Senate in 1845 Choate resumed his practice in Boston. He was scholarly and polished, with a magnetic personality, and these qualities, combined with strong sense and a remarkable gift of language, made him one of the greatest forensic orators America has produced.

Chocolate, *Chok' o late*. See COCOA, *Ko' ko*.

Choctaw, *Chok' taw*, a tribe of North American Indians formerly living in Mississippi and Alabama but now removed to Oklahoma. They were allied to the French, but recognized the supremacy of the United States in 1786. The last of their lands was ceded in 1830. Siding with the Confederate troops in the Civil War, they lost both slaves and territory. They number about 18,000 and are making marked progress in education. See FIVE CIVILIZED TRIBES.

Choiseul-Amboise, *Shwah"zul'-Ahn'-bwahz*, **Etienne François**, DUKE OF (1719-1785), a French statesman. Early in life he was the Count Stainville. He won distinction in the War of the Austrian Succession. On his return to Paris he won the favor of Mme. de Pompadour and was sent as ambassador to Rome and later to Vienna. He became Duke of Choiseul at this time. He conducted foreign affairs during the Seven Years' War. He could not save Canada and India for France, but he added Corsica and Lorraine. He was friendly to the political writers and brought about the banishment of the Jesuits. This last

act led to his downfall in 1770 through a court intrigue supported by Mme. du Barry.

Choke Damp, a name given by miners to the carbon dioxide which forms in mines upon the explosion of *fire damp*. The fire damp, which has been produced by the decay of animal or vegetable matter out of contact with air, forms with air a highly explosive mixture. If a current of air enters the chamber where this gas has formed, and anything causes ignition, an explosion takes place, as the fire damp burns with the oxygen of the air and produces carbon dioxide. In case the entrance of fresh air is cut off, any persons confined in the chamber are suffocated, because of the lack of free oxygen. The gas in itself is not poisonous but does not support respiration. See CARBON DIOXIDE.

Cholera, *Kol' er a*, the name of four different diseases. They are cholera morbus, cholera nostras, cholera infantum and Asiatic cholera. Cholera morbus is a form of diarrhea, and is characterized by vomiting, a chilly sensation, cramps in the abdomen and slight prostration. It usually occurs in summer and is caused by imprudent eating, immoderate drinking of iced water, or exertion or exposure immediately after eating heavily. Treatment consists of emptying the stomach and intestines and in giving opium and aromatics. Cholera nostras has similar though more pronounced symptoms. Cramps may extend to the limbs, and delirium or convulsions appear. Treatment is like that used for cholera morbus, with the addition of a hot bath, with warm covering afterwards and stimulants to support the heart. Cholera infantum is described under its title.

ASIATIC CHOLERA. This disease is the one usually indicated by the term *cholera*. It is infectious and believed to be conveyed by a bacillus through the medium of drinking water. Statistics furnish abundant evidence that cholera is a miasmatic disease. The majority of cases begin with restlessness, nausea and a feeling of chilliness. These symptoms

are followed by vomiting and diarrhea, accompanied by vertigo. After a few hours the surface becomes blue, the face gray, with palpitation of the heart and buzzing in the ears. The patient suffers with severe pains in the stomach and in the region of the heart, cramps in the calves and arms, and thirst. The discharges from the bowels are painless and have the appearance of rice water. About 50 per cent of the mild cases recover, but only about ten per cent of the severe cases survive. A hypodermic injection of opium with atropia has been found successful as a preventive, as well as a cure. Asiatic cholera originated in India, so far as is known. It is almost constantly present in Calcutta and in the southern part of Bengal. Epidemics of the disease have been extensive and frequent in all parts of Asia. It has appeared in Canada and in the United States, and from time to time in Europe.

Cholera Infan'tum, a name given to a diarrheal disease in children. It is similar to Asiatic cholera, and is caused in the majority of cases by impurities in the bottle milk fed to infants. The first symptoms are diarrhea, usually of a few days' or weeks' duration, though in some cases death takes place after a few hours of the beginning of the malady. The principal symptoms are weakness, rising temperature, vomiting, almost hourly passages from the bowels, loss of weight, nervousness, pallor, stupor and coma or convulsions. Treatment consists in washing out the stomach and intestines, in giving hypodermic injections of morphine and injections of salt solutions, graduated baths and enemata of iced water to reduce temperature, and in administering stimulants. If the patient rallies, he may be given albumen water, whey or barley water. Two-thirds of the cases result fatally.

Chopin, Sho pan', Frederic François (1809-1849), a Polish pianist and composer of French extraction, born near Warsaw. He received a good general education and studied music with Adalbert Zwiny and the scholarly musician Joseph Elsner. His first public appear-

ance was made in 1829, after which he traveled extensively, giving concerts. Chopin was a man of extreme refinement in taste and revealed himself in his music as no other composer has done. His greatest works were his briefest,—mazurkas, waltzes, preludes, etudes, nocturnes—those that reveal a passing mood; his sustained efforts were less successful. He will always hold rank as a supreme genius of the pianoforte.

Christ, Disciples of, a Christian denomination of the United States, also known as Campbellites. Other names applied to their organization are Church of Christ and Christian Church. Thomas Campbell, a Scotch Presbyterian minister of western Pennsylvania, took the initial step toward the organization of this sect in 1809, when he urged in a *Declaration and Address*, a complete restoration of apostolic Christianity, at the same time deploring the divided state of the Church. He was assisted in his work by his son Alexander, who is considered the founder of the denomination, and, though the Campbells hoped to accomplish their aim without forming a new religious organization, they found they had to act independently of other denominations. Their first church was founded in 1811. The Disciples of Christ accept the Bible alone as their authority in faith and practice, they believe in adult baptism, by immersion, observe the Lord's Supper the first day of each week and emphasize the doctrine of Christ's divinity. They have a congregational form of government. In 1920 they had in the United States a membership of over 1,500,000. See CAMPBELL, ALEXANDER.

Christian, Kris' chan, the name of ten Danish kings. Christian II (1481-1559) was King of Denmark and Norway and later added Sweden to his possessions. He is remembered as the friend of the tradesmen and peasantry. His severity in Sweden led to the revolt headed by Gustavus Vasa, as a result of which Christian was made a prisoner in 1531, and remained, until his death, a captive upon the Island of Alsen.

CHRISTIAN IV (1577-1648) was King

of Denmark and Norway from 1588 to 1648. He had at first a reputation for military operations, but he proved to be far more capable in encouraging civil and industrial reforms and improving the trade relations of his dominions.

CHRISTIAN X (1870-) became king upon the sudden death of his father, Frederick VIII, in May, 1912. He is a man of pleasing personality, and his military bearing and enjoyment of outdoor sports appeal to his subjects. He has had experience in governmental affairs, for during the extended absences which his father enjoyed each year, the burden of authority fell upon the young prince. His capability in dealing with practical questions shows him to be a man who understands the present needs and aims of his country.

Christian IX (1818-1906), a Danish king. He ascended the throne in 1863 as successor of the last member of the House of Oldenburg. In 1866 he lost Schleswig-Holstein and Lauenburg in his war against Austria and Prussia. From this time his reign was very successful and marked by an extension of religious and personal liberty. He was connected with many reigning houses of Europe, and among his children are Alexandra, wife of the late Edward VII of England; Dagmar, the mother of the Czar Nicholas II; and George, the King of Greece. Frederick, his eldest son and successor, was the father of Haakon VII of Norway.

Christian Endeavor, The United Society of, an interdenominational religious organization of young people of various Protestant churches. The first society was founded at Portland, Me., in 1881, by the Rev. Francis Clark. The organization is founded upon the following principles: "Personal faith in Jesus Christ; loyalty to the individual church and to the denominational organization and loyalty to the universal Church of Christ in every land." Every local society is under the direction of its own church, but there is an interdenominational board of over 100 trustees, whose powers are advisory and who serve as a

bureau of information. The organization has nearly 80,000 branches and a membership of over 4,000,000.

Christiania, *Kris'te ah' ne ah*, officially **Kristiania**, the capital of Norway, situated on the Christiania Fiord. Behind the city rise beautiful pine-wooded hills; the buildings are modern and built of brick and stone. The chief features of interest are the Parliament House, the university, the royal palace, the National Theater with its large statues of Ibsen and Björnson, several cathedrals, the historical museum, the museum of art, the Akershus (an old castle) and several gardens, among which is the Holmenkollen, where the *ski* tournaments are held every February. The industries are represented by the shipbuilding yards, sawmills, breweries and factories for paper, flour, soap, cotton and woolen goods, gunpowder and chemicals. The storing and packing of ice and the preparation of granite paving stones are also important trades. Christiania is one of the cleanest and most healthful cities in Europe. It was founded in 1048, and its name was changed from Oslo to Christiania in 1624. Population estimated 250,000.

Christianity, the religion founded by Jesus Christ. At first it was considered a sect of Judaism, but within the first few years of its propagation it became a distinct religion. The followers of Jesus were first called Christians at Antioch about 65 A. D., but the founding of Christianity is generally considered to date from the death of Christ, soon after which his disciples began to spread his teachings. By their travels the apostles introduced Christianity into western Asia, Egypt and the countries of southern Europe, where they and their followers made many converts and founded churches during the first century, and it is estimated that at the end of the third century one-half the inhabitants in the Roman Empire, as well as most of the inhabitants of surrounding countries, had accepted its doctrines. Each century has added to the number of followers, and Christianity is the recognized religion of

Europe, with the exception of Turkey, of the Coptic people of Africa, of North and South America and of Australia and surrounding islands. Christianity has also gained a foothold in China, Japan, India and Siberia and has been carried by missionaries to practically all countries and peoples of the world.

The fundamental principles of Christianity are found in the teachings of Jesus as recorded in the New Testament. They are: (1) belief in God as a spiritual, righteous, loving Father, the Creator of the Universe and the personal friend of his earthly children; (2) belief in Jesus Christ as the Son of God and the Savior of the world; (3) personal acceptance of Christ as a savior and forgiver of sin; (4) the duty of men to love God, the Father, to turn away from sin, to love each other, to abandon lives of selfishness and to live in peace. Christians believe that the fulfillment of these principles leads to eternal life with God.

The best authorities estimate the number of Christians in the world at about 538,000,000. See JESUS CHRIST; ROMAN CATHOLIC CHURCH; GREEK CHURCH; PROTESTANTISM.

Christian Scientists, the adherents of a system of theology known as Christian Science. The Christian Science Church was founded in 1879 by Mary Baker Eddy, the discoverer of Christian Science and author of its textbook, *Science and Health, with Key to the Scriptures*. The Church was organized "to commemorate the word and works of our Master, which should reinstate primitive Christianity and its lost element of healing" (Church Manual). In 1892 the Church was reorganized as The First Church of Christ, Scientist, known as The Mother Church, in Boston, Mass.

All Christian Science churches and societies, of which there are over 1300 in the United States and more than 130 in foreign countries, are branches of The Mother Church. Lesson-sermons compiled from the Bible and *Science and Health, with Key to the Scriptures* are read at the services in Christian Science churches. There are about 5200 Chris-

tian Science practitioners regularly devoting their time to the practice of Christian Science Mind healing.

Mrs. Eddy founded the *Christian Science Journal*, *Sentinel*, *Quarterly*, *Der Herold der Christian Science* and *The Christian Science Monitor* (a daily newspaper), all of which are published by the Christian Science Publishing Society in Boston.

There is in connection with the Christian Science movement an official board of lectureship designed to furnish the public correct information concerning the fundamental teachings of Christian Science. Lectures given by members of this board are free to the public.

Concerning healing, Mrs. Eddy, in her book *Retrospection and Introspection*, says:

"I claim for healing scientifically the following advantages. (1) It does away with all material medicines, and recognizes the antidote for all sickness, as well as sin, in the immortal Mind; and mortal mind as the source of all the ills which befall mortals. (2) It is more effectual than drugs, and cures when they fail, or only relieve, thus proving the superiority of metaphysics over physics. (3) A person healed by Christian Science is not only healed of his disease, but he is advanced morally and spiritually. The mortal body being but the objective state of the mortal mind, this mind must be renovated to improve the body."

In the same work, *Retrospection and Introspection*, Mrs. Eddy narrates some experiences of her childhood and her early struggles towards the light, and in a chapter entitled *The Great Discovery* she gives the first authentic account of her discovery which ever appeared before the public. She writes, on page 24:

"The discovery came to pass in this way. During 20 years prior to my discovery I had been trying to trace all physical effects to a mental cause; and in the latter part of 1866 I gained the scientific certainty that all causation is Mind, and every effect a mental phenomenon.

My immediate recovery from the ef-

fects of an injury caused by an accident, an injury that neither medicine nor surgery could reach, was the falling apple that led me to the discovery how to be well myself, and how to make others so."

In 1912 the estimated number of persons depending upon Christian Science for healing and regularly reading its literature was over 1,000,000. See EDDY, MARY BAKER GLOVER.

Christie, James Elder (1847-), a Scottish artist, born at Guardbridge, Fifeshire. He studied at South Kensington and at the Royal Academy, being awarded a gold medal at the former institution in 1875, and receiving another from the Academy in 1877, for historical painting. Important among his paintings are *Tam O'Shanter*, *Pied Piper of Hamelin*, *A Lion in the Path*, *The Four Maries*, *The Red Fisherman*, *Gather Ye Rosebuds*, *The Vision of Mirza*, *Vanity Fair* and *the Dying Swan*.

Christina, Kris te' na, (1626-1689), Queen of Sweden, only child of Gustavus Adolphus, whom she succeeded when six years old. She received the education of a man rather than that of a woman, and to this, in part, may be attributed the eccentricities of her life. During her minority Sweden was governed by five high officials of State; but in 1644 Christina assumed the reins of power and in 1650 was crowned *king*, having previously declared her cousin, Charles Gustavus, her successor. For the next four years her rule was characterized by ability and firmness and by a patronage of learned men, artists and the like which reached extravagance. However, she then abdicated, though reserving to herself sufficient revenues, complete independence and absolute authority over her suite and household, and proceeded to Brussels, where she embraced the Roman Catholic faith. Subsequently she went to Rome, which she entered on horseback, dressed as an Amazon, and on the confirmation of Pope Alexander VII, adopted the surname of Alessandra. On the death of her cousin, in 1660, Christina failed in an attempt to be reinstated on the throne, and six years later she

unsuccessfully aspired to the crown of Poland. The latter years of her life were spent at Rome in artistic and scientific studies.

Christmas, Kris' mas, the festival commemorating the birth of Christ, observed annually on the 25th of December. Just when this festival originated is a matter of uncertainty, but references to it occur as early as the third century. Some diversity existed in the early Church as to the day for observing Christ's nativity; the Eastern Church celebrated the festival on the sixth of January. By the time of Chrysostom (fourth century) the Western Church had fixed on the 25th of December, and this date was gradually adopted by the Eastern Church. Among the factors determining the selection of the month of December was the prevailing custom of celebrating heathen festivals about this time of the year. The German and Celtic tribes, for instance, held their Yule feast in the winter solstice, to celebrate the return of the fiery sun-wheel. Many objects inseparably connected with the Christian festival had their origin in paganism, such as the holly, the mistletoe and the Yule log. The Catholic, Anglican and Lutheran churches especially emphasize Christmas as a religious festival, and Catholic priests can celebrate three masses at this time.

Christopher North. See WILSON, JOHN.

Chromium, Kro' mi um, a hard, steely metal, not found free in nature but generally in a combination of iron and oxygen called chromic iron. At ordinary temperatures it does not oxidize, but one of its oxides, chrome green, is used in the manufacture of colored glass. Other of its compounds form green or violet pigments. Chromic iron, from which chromium is prepared, is found in North America, Sweden, Hungary, and in especially large quantities in the Ural Mountains.

Chronicles, Kron'e k'lz, **First and Second**, the books of the Old Testament which, in the English Bible, follow the books of *Kings*. In the Hebrew

manuscript they form but one book. The name *Chronicles* was applied by Jerome. The contents of the books comprise: (1) genealogical tables, interspersed with geographical and historical facts; (2) the history of the reigns of David and Solomon; (3) the history of the Kingdom of Judah from the separation under Rehoboam to the conquest of the kingdom by Nebuchadnezzar. The second book concludes with a notice of the permission granted to the exiles, by Cyrus, to return home and rebuild their Temple. The *Chronicles* are among the latest of the Old Testament compositions. Their authorship is not certainly known. See BIBLE, subhead *The Old Testament*.

Chronograph, *Kron' o graf*, a peculiar watch or clock employed to measure and record minute divisions of time. Chronographs are used in astronomical observatories when it is found desirable to know and register the exact time of an event. The stop watch used in timing horses on race courses is properly a chronograph. This is similar to an ordinary watch excepting the timing apparatus, which consists of hands which mark seconds and fractions of a second on the large dial. They are provided with a device by which they can be instantly stopped and started. See TELESCOPE; WATCH.

Chronology, *Kro nol' o jy*, the science which arranges in succession the various events in history. An epoch is selected and events are arranged in order of time as occurring either before or after the chosen epoch. The chief systems of ancient times are the Babylonian, which computed from the era of Nabonassar, 747 B. C.; the Greek, beginning with the Olympiad, 776 B. C.; the Roman, from the founding of the city in 753 B. C. The chief modern systems are the Christian, supposed to start from the birth of Christ; the Mohammedan, from the Hira, or flight of Mohammed; the Chinese, from the time of Emperor Yao, more than 2000 years B. C.

Chronometer, *Kro nom' e ter*, an instrument for measuring time and used at sea for determining longitude. The mechanism is practically the same as that

of a watch, except that the chronometer is larger. The balance wheel contains several metals, so arranged that it will not be affected by differences in temperature. The instrument is also hung in a frame on balancing rings called gimbals, so it will not be affected by the ship's motion. See WATCH.

Chrysanthemum, *Kris an' the mum*, a plant of the Composite Family, highly cultivated because of its handsome, showy flowers. Chrysanthemums are natives of Persia, eastern Asia or northern Africa, and in their natural state are not particularly beautiful, with their erect, fibrous stems, coarse leaves and rather common-looking flowers. The cultivated chrysanthemums, however, are stately plants; the stems are often somewhat angled, and the hairy leaves, larger at the base of the stem than at the summit, are divided into many irregular lobes with wavy edges; in color they are a pale green or often a dusty silver. The flowers are made up of a flattened disk of tiny florets surrounded by numerous green, leaflike divisions, collectively termed an involucre. Many plants of the Composite Family have in their outer rows of florets merely flat, petal-like rays, but in the chrysanthemum, each blossom if pulled out will be found to have a tiny tube at its base. Taken together these flowers form large and beautiful heads familiar through greenhouse culture.

The varieties of these cultivated plants are almost numberless and vary in size, shape and color of the flower. They are all probably descendants of the Chinese chrysanthemums, which have been cultivated in China and Japan for many years. English and American florists have recently given great attention to their improvement and what has been accomplished may be understood when one compares the wild chrysanthemums with our beautiful hothouse varieties so popular everywhere in the autumn. Big balls of the blossoms in white, yellow, magenta, lavender or variegated colors are commonly seen in October, as there is no autumn-blooming plant more hand-

some and more lasting. In many varieties the blossoms attain a diameter of eight inches or more, and the florets may curve inward to form a ball, spread flat like a disk or extend in irregular arrangement, giving the flower a curious, ragged appearance.

The "chrysanthemum show," which originated in Japan where new varieties of chrysanthemums were greeted with enthusiasm, has become popular with horticulturists of many cities of the United States, and yearly displays, which are widely attended, are held in New York, Philadelphia, Chicago and elsewhere. The chrysanthemum is the national flower of Japan.

Chrysoberyl, *Kris' o ber'il*, a hard six-sided crystal resembling beryl. It is usually green, some specimens appearing red in certain lights, and is of varying transparency. That of superior quality is made into gems. It occurs in Brazil, Ceylon and the Ural Mountains. In the United States it is found in Connecticut and Maine. Oriental topaz, a variety of chrysoberyl, was known to the ancients.

Chrysoprase, *Kris' o praze*, an apple-green ornamental stone, found in Oregon and California and in parts of Germany. In earlier times it was prized as a precious stone, but is no longer much used because of its tendency to lose color when exposed to intense light or moderate warmth. It is mentioned by Biblical writers and was known to the ancient Greeks.

Chrysostom, *Kris' os tum*, John, Saint (about 347-407), a Greek Father of the early Church, born in Antioch. Early in life he became so distinguished by his glowing speech that he fulfilled the meaning of his name, Chrysostom, the golden-mouthed. He studied philosophy for some time, but finally determined to devote himself to the study of the Bible and to the life of a monk in Syria. In 398 he was called to an important position in Constantinople. Here he gained the ear of all classes of people, not alone by the attraction of his wonderful eloquence, but also by the deprivations to which he subjected himself in order to

have more to bestow upon the needy. This conduct gave him the name of "John, the Almoner." But his life as well as his teachings and personal efforts to inspire a higher type of living among the clergy aroused bitter enmity which led to his banishment to Pityus on the Black Sea. He died on the way thither.

Church, Frederick Edwin (1826-1900), an American painter, born at Hartford, Conn. As a pupil of Thomas Cole and as a close student of natural phenomena, he developed extraordinary technical skill, which he employed in an attempt to render such marvels of nature as cataracts, volcanoes in eruption, icebergs, rainbows, etc.; and in the day of his greatest success his works had tremendous, though brief, popularity in the United States and in Europe.

Church'ill, Lord Randolph Henry Spencer (1849-1895), an English statesman. He was educated in Eton and at Oxford. In 1874 he visited America and married Miss Jennie Jerome of New York City. He returned to England in the same year and entered Parliament, where he became a strong speaker and leader of the Fourth Party in the chamber; and, later, of the Conservative Party. When Salisbury came into power he made Churchill secretary for India, and the following year, chancellor of the exchequer. In 1886, when Gladstone's Irish bill was defeated, Churchill became leader of the commons. On account of certain differences of opinion between himself and his colleagues he resigned; but became a member of Parliament again in 1892. He died in London.

Churchill, Winston (1871-), an American novelist, born in St. Louis, Mo., and educated at the United States Naval Academy, Annapolis. After serving for a short time on the ship *San Francisco*, he turned to literature, editing in 1895 the *Cosmopolitan Magazine*. His first novel, *The Celebrity*, appeared in 1898, and was speedily followed by a trilogy of American historical novels, *Richard Carvel*, *The Crisis* and *The Crossing*. *Coniston* and *Mr. Crewe's Career* deal with certain phases of Amer-

ican politics. Mr. Churchill has taken an active part in the politics of the state in which he resides, New Hampshire, and served in the Legislature in 1903 and 1905. In 1912 he was the candidate for governor of New Hampshire on the Progressive Party ticket.

Churchill, Winston Leonard Spencer (1874-), an English author and politician, eldest son of Lord Randolph Churchill. He was educated at Harrow and at Sandhurst. Having entered the army in 1895 he served with the Spanish forces in Cuba, and distinguished himself with the British troops in India in 1897, and in the Sudan in 1898. Early in the Boer War he went to the Transvaal as correspondent for the *Morning Post*, was captured and taken to Pretoria, but escaped after a month's imprisonment. In 1900 he was elected a Conservative member of Parliament for Oldham. He opposed Chamberlain's tariff reform proposals and acted with the Liberals in 1904-05, and in December, 1905, became Parliamentary secretary for the colonies in the Campbell-Bannerman ministry. At the general election the following January he was chosen as a Liberal for Manchester, North West; in April, 1907, became privy counselor; the following year was elected for Dundee and in 1910 became home secretary. His publications include *The Story of the Malakand Field Force*, *The River War*, *Savrola*, *London to Ladysmith via Pretoria*, *Ian Hamilton's March*, *Lord Randolph Churchill* and *My African Journey*.

Churchill River, a river situated in Saskatchewan and Keewatin District, Canada. It rises in La Loche Lake and flows northeast about 900 m., passing through a number of lakes and emptying into Hudson Bay at Churchill Harbor. Its chief tributaries are the Beaver, Sandy and Reindeer rivers, and it is navigable for canoes alone, requiring frequent portage. It formed part of the old voyageur route to the Peace, Athabaska and Mackenzie rivers, the trail of the French and Indian fur traders.

Churn, Chern, a vessel in which

cream or milk may be so shaken that the fat collects and butter forms. The first churns were bottles made from skins in which sheep's or goat's milk was used for butter making. The simplest American churn is a wooden keg in the shape of a cone; its cover has an opening through which the handle of the "dasher" is inserted. The cooled cream is placed in the keg and churned by hand. Barrel churns are more commonly used at present. Such a churn consists of a barrel set in a frame so that it may be turned by a handle. Many kinds of churns are in use, however, most of which are operated by hand. In the creameries the churns are large vats generally rotated by steam or other power. See CREAMERY.

Cicada, *Sik a' da*, a family of well-known insects of the order Hemiptera. The most interesting member of the family is the so-called 17-year locust, or 17-year cicada, which has a period of development about six or seven times as long as the entire life of most insects. This cicada is a black, red-banded insect having a proboscis, plainly arising from the head, red eyes, and wings veined with red at the base and outlined with red. The eggs are laid in slits cut in young branches of trees; this slitting of the twigs is the only harm done by the cicadas, since they do not feed upon the leaves nor upon the farmer's grain fields; because they appear periodically in great hordes they are somewhat dreaded. When the eggs hatch, the young fall to the ground, burrow and begin their long period of imprisonment, feeding slowly upon the decayed vegetable matter of the orchard soil. After 16 years of life there, they emerge, crawl to some tree trunk to molt and then fly to the tops of the trees for a relatively short adult life of one or two years. The life history of the 17-year cicada is so well known and its habits so closely watched in the United States by the Federal Department of Agriculture, that its appearance can be predicted quite accurately. There are about 20 broods, and bulletins issued by the agricultural department, telling when and where these broods will

appear, may be had upon request. About the only necessary precaution against the cicadas is care not to set out young fruit just before the time for the appearance of one of these broods.

The harvest fly, or common cicada, is black above, with head and thorax spotted with green, and transparent, heavily-veined wings. The abdomen seems frosted with a whitish powder, and its legs are green. Its shrill, dry note, "like the rattle of a snake," may be heard between ten o'clock and four on hot midsummer days and seems to intensify the heat. Only the males are capable of sounding the note, a fact which led an ancient Grecian poet to say, "Happy is the cicada; its wife has no voice." The sound is made by a convex drum membrane, which can be rapidly vibrated from convex to concave; the loudness of the sound is regulated by the opening and closing of the sound chambers within. In all species of cicadas, the males are fitted with these resonators. The life history of the common cicada is not fully known, but its ravages are not particularly harmful.

Cicero, *Sis'er o*, **Marcus Tullius** (106-43 B. C.), the greatest Roman orator, was born at Arpinum of a prosperous family of knightly rank, and was early placed under the best instructors in Rome. At 26 he began to plead at court and he allied himself from the first with the democracy. When Sulla triumphed, Cicero went to Asia Minor and studied under famous orators at Rhodes. In 76 B. C. he was governor of Sicily, where he proved himself honest and capable, and in 63 B. C. he gained the consulship. While consul, his service to the state was of the highest importance in exposing and thwarting the designs of Catiline (See CATILINE). In 58 B. C., a demagogue, Clodius, secured his exile. He was recalled the next year, but his villa and beautiful house on the Palatine, which had been seized and plundered, were not restored. Cicero sided with Pompey against Cæsar, but was reconciled to Cæsar after the Battle of Pharsalia. He was jubilant over the

death of Cæsar and tried to use Octavius as a tool, but when Octavius joined forces with Antony he sacrificed Cicero to Antony's wrath, and Cicero was slain. Cicero stands in the very foremost rank of the world's orators. His letters reveal much of the life of his time and show that he was a kind-hearted, generous and affectionate Roman gentleman. His writings gave a fixed character to the Latin tongue, and his influence on the language and literature of his day was extensive and permanent.

Cid, *Sid*, **The Poem of the**. See LITERATURE, subhead *Spanish Literature*.

Cider, *Si' der*, a fermented liquor made principally from ripe apples. The apples are crushed and then put into a press to extract the juice. This flows into a cask, freely exposed to the air, when it ferments. Freshly prepared cider is an agreeable, healthy beverage, but when allowed to ferment too long, becomes hard and intoxicating. Applejack is apple brandy, made by distilling the fermented juice of apples. Orange cider is made from oranges by a process similar to that used in making apple cider. See DISTILLATION.

Cienfuegos, *Syn fwa' gos*, a city of Cuba located on the southern coast, 189 m. s.e. of Havana. It has an excellent harbor on the well-protected Bay of Jagua and is the most important port in the southern part of the island. It has wide streets, pleasant parks, well-equipped hospitals and other important public buildings. The chief exports from this port are sugar, cocoa, molasses and tobacco. Population 70,500.

Cigar', a small roll of tobacco leaves used for smoking. Cigars are made by hand, and in their manufacture workmen become very expert. The largest and most choice leaves are used for the outside or wrapper, which is so rolled as to hold small leaves within position and also to give the cigar its shape. The best cigars are made in Havana, but large quantities of Cuban tobacco are imported into the United States and used with American tobacco, so that cigars of good quality are made in this country. A spe-

cial tax is placed upon cigars, whether imported or manufactured within the country. See TOBACCO.

Cimabue, *Che"mah boo'a*, **Giovanni** (about 1240-about 1302), the first illustrious name in the history of Italian painting. Cimabue, inspired by the growing naturalism of Gothic sculpture, and particularly by the work of Niccola Pisano, began to break from the traditional fetters and to give to figures a semblance of life. The creation of his *Madonna and Child with Angels* was epoch-making in its departure from tradition and in the impetus which it gave to subsequent effort in naturalistic pictorial representation.

Cimon, *Si'mon*, (?-449 B. C.), a general and statesman of Athens, and the son of Miltiades. His first task in life was to pay a heavy fine which his father had incurred from the state and which he was unable to pay before his death. Cimon took part with honor at Salamis in the consolidation of the Delian League. At the Battle of Eury-medon he gained a decisive victory over the Persians. When war broke out in 464 B. C. between Sparta and her conquered province, Messenia, Cimon favored sending help to Sparta. The expedition failed, and Cimon was disgraced and ostracized. He returned, however, six or seven years later, and died in Cyprus before the walls of Citium in 449 B. C.

Cinchona, *Sin ko' na*, or **Chincho'na**, a name given to a genus of South American plants of the Madder Family. They are generally trees but may be shrubs or even herbs, and vary greatly in manner of growth. The best known and only ones of commercial value are those from which quinine and Peruvian bark are procured. These are tall trees seldom less than 80 ft. in height. Their leaves are undivided, pointed and evergreen. The flowers are fragrant and grow in graceful clusters, white or pink in color. Each blossom has five petals, five sepals and five stamens. The fruit is dry with flat, winged seeds.

The cinchona is a native of the Andes

and is found generally at an altitude of from 3000 to 8000 ft. The trees grow in isolated groups and are procured with great difficulty by the natives. The bark is stripped from the growing tree, which, if allowed to stand, will produce a second growth, but more often the tree is felled to secure all of its bark at one trip. The bark of the smaller branches rolls in "quills" while that of the trunk is shipped flat. Quinine, which is the chief product of the cinchona bark, is a bitter powder of great value as a remedy for fever, and is widely exported. Because of its great usefulness the cinchona tree has been introduced into the East Indies, and an effort is being made to increase the production by care of the trees and greater attention to their needs. See QUININE.

Cin'cinnat'i, **Ohio**, the county seat of Hamilton Co. and second city of the state, is situated on the Ohio River, opposite the mouth of the Licking, 263 m. s.w. of Cleveland, 303 m. by rail s.e. of Chicago and 764 m. from New York, and on the Baltimore & Ohio, the Big Four, the Pennsylvania and numerous other railroads. The city is beautifully situated on three successive semicircular terraces which rise from the river, the first being about 65 ft. above low water; the second elevation is from 50 to 100 ft. higher; and the third ranges from 150 to 300 ft. higher than the second. The second and third terraces contain a number of summits, the most prominent being Mt. Adams, Mt. Auburn, Mt. Look-out and Fairview Heights. From each of these an excellent view of the city and surrounding country can be obtained. The city extends along the river for about 20 m.; it has a width of about 5 m. and has an area of about 72 sq. m. On the western side Mill Creek flows across the city from north to south. Its valley is about half a mile wide and has gentle slopes. The railroad stockyards occupy a portion of the eastern slope. Excepting along the river, most of the streets run north and south and east and west, the variations from this plan being such as were necessary on account of the

irregular surface of the ground. The lowest level along the river is the seat of the shipping interests and is occupied chiefly by warehouses, railroads and docks. On the next level are the wholesale and retail business streets, upon which are found public buildings and business blocks of great architectural merit. On the highest level are the principal residential sections, beautified by shade trees, lawns and handsome residences.

The city maintains an excellent system of street railways, with lines extending to all suburbs. Nearly all lines meet at Fountain Square, the chief business center. The Ohio is spanned by five remarkable bridges, each over a half mile long, which connect the city with the suburbs on the south bank. That of the Cincinnati Southern Railway cost over \$3,348,000 and has one of the longest spans in the world; that extending to Covington is a suspension bridge; and the bridge between Cincinnati and Newport is of the Cantilever type.

PARKS AND BOULEVARDS. The park system embraces an area of over 2550 acres, besides a number of pleasant driveways within the city and suburbs. Eden Park on Mt. Adams in the south-central part of the city and with an area of 200 acres is the most noteworthy. This park is widely known for its landscape gardening, its gateway "Elsinore," its large reservoirs for city water, and as the seat of the art museum and the art academy, whose buildings are patterned after those of the Kensington Museum in London. Burnet Woods (163 acres) to the northwest, contains the buildings of the University of Cincinnati and a lake much used for boating and skating. The Zoological Garden, just north of Burnet Woods, contains choice collections of wild animals and birds. Throughout the city there are a number of small parks and squares, and the native forests on most of the hills have been preserved and add much to the attractiveness of the city. The Tyler-Davidson Fountain in Fountain Square on Fifth Street between Vine and Walnut, which was presented

to the city by Henry Probasco, was cast in the Royal Foundry, Munich, at an expense of \$200,000. It is considered one of the finest fountains in the world and one of the world's greatest works of art as well. At the intersection of Eighth and Vine streets is an equestrian statue of Gen. William Henry Harrison, and at Eighth and Race streets is a statue of Garfield. Both are works of great merit. Spring Grove cemetery, north of the city, contains a number of fine monuments and mausoleums and a beautiful chapel.

BUILDINGS. The Federal building facing Government Square, containing the post office, customs-house and other government offices, is an imposing structure. The city hospital consists of a number of buildings, each splendidly equipped for its special purpose. The scenic and sanitary surroundings are excellent. The city hall is an imposing structure. Other buildings worthy of mention are the Court House, the Chamber of Commerce, the Masonic Temple, the Art Museum, the Y. M. C. A. Building, the public library, the Third National Bank, the Rookwood Pottery Building, St. Francis Xavier's College and University, Hughes, Woodward, East Side High Schools, and Dixie Terminal. The most prominent church edifices are St. Peter's Cathedral, having for its altarpiece Murillo's *St. Peter Liberated by an Angel*; the Church of St. Francis de Sales, having the largest swinging bell in the world; St. Paul's Protestant Episcopal, the First Presbyterian, St. Paul's Methodist, the Central Christian, and the Avondale and Plum Street Jewish Synagogues.

INSTITUTIONS. The University of Cincinnati, which is at the head of the public school system, is the leading educational institution. Affiliated with it are departments of law, medicine and dentistry and an observatory, which is located on Lookout Mountain. Other educational institutions are the Ohio Mechanics Institute, Lane Theological Seminary, St. Francis Xavier and St. Joseph's colleges (Roman Catholic), the Hebrew Union Col-

lege and a number of medical schools, dental schools, law schools and business colleges. The Cincinnati Society of Natural History has a valuable museum, and the leading libraries include the Cincinnati Public Library, the Young Men's Mercantile, the Law Library, that of the Mechanics Institute, the University Library, the Library of St. Xavier's College and the Lloyd Library and Museum. The city contains a large number of benevolent and charitable organizations. There are numerous hospitals, among which are the Cincinnati Hospital, the Jewish, the Good Samaritan, the United States Marine, the St. Mary's, the Ohio Hospital for Women and Children and the Presbyterian Hospital. A house of refugee children and a workhouse with shops and grounds are maintained. The public schools with their fine buildings, equipment and varied courses of study are widely noted for their excellence.

INDUSTRIES AND COMMERCE. The position of Cincinnati made it an important river port before the construction of railways. Since that time it has also become one of the leading railway and manufacturing centers in the country. Among the leading manufacturing industries are the production of pig iron and machine-shop products, men's clothing, lumber and lumber products, soap, saddlery, musical instruments, wagons and carriages and society banners and uniforms. The city is also one of the important slaughtering and meat-packing centers of the country. Lines of steamers ply between the city and other Ohio and Mississippi River ports and carry large quantities of coal and other bulky freight. The Miami Canal, connecting the Ohio with Lake Erie, was formerly an important waterway, but since the construction of so many railways it is but little used. The city is an important point for transshipment of freight between the northern and southern sections of the Mississippi Valley, and has an extensive wholesale trade.

HISTORY. Cincinnati occupies a site where the mound builders formerly dwelt. The first settlement by white

men was made in 1788 and named Lonsantiville. In 1789 Ft. Washington was built. In 1790 General St. Clair, who was appointed governor of the Northwest Territory, laid out the County of Hamilton, changed the name of the settlement to Cincinnati and made it the county seat. Fear of Indian hostilities prevented any rapid growth of the settlement until after the crushing defeat of the Indians by Gen. Anthony Wayne at the Battle of Fallen Timbers in 1794, which removed all further danger of Indian depredations. Cincinnati was incorporated as a village in 1802, received a new charter in 1815 and became a city in 1819. The city's growth has been constant and substantial. Situated on the border of the Southern States, the city was one of the storm centers of the anti-slavery agitation for a number of years preceding the Civil War. All through that struggle Cincinnati was an important post and depot of supplies, and in 1862 was threatened by a Confederate force. Since the close of the war the city's record has been one of uneventful, continuous prosperity. The population of the city proper, according to the Census of 1920, was 401,247. The Metropolitan district includes a considerably larger population.

Cincinnati, Society of the, a patriotic society founded by the officers of the American army at the close of the Revolutionary War. It was organized at Fishkill, N. Y., May 13, 1783. All officers who had served in the American army for three years or who had been honorably discharged, and the eldest male descendants of such officers, were eligible to membership in the organization. The society had 13 branches, one in each of the original states. Washington was the first president. The society met with popular disfavor from the beginning. Some considered it an aristocratic order similar to those in Europe and believed its tendency to be contrary to the spirit of the liberty. Others considered it a military conspiracy, organized to secure for its members all the offices in the new government.

The Legislatures of some states passed resolutions censuring it, and Ædanus Burke, chief justice of South Carolina, wrote a pamphlet proving that it would cause the loss of everything gained in the Revolution. The state societies soon died and the general society lost all influence. The emblem was a bald eagle suspended by a dark blue ribbon with white borders, symbolizing the union of France with America.

Cincinnati, University of, at Cincinnati, Ohio (1870). The bequest of approximately \$1,000,000 by Charles McMicken in 1858 resulted in the passage of a special act in 1870 under which the academic department was organized in 1874. This is the most completely organized municipal university in America. Although the endowment fund is considerable, the running expenses are met by taxation. Numerous well equipped buildings have been erected since 1895 on a beautiful site of 43 acres, in Burnet Woods Park. The College of Medicine adjoins the city hospital. The university is governed by a board of directors appointed for six-year terms by the mayor. The colleges of the University are McMicken College of Liberal Arts, Graduate School, College for Teachers, College of Engineering and Commerce, College of Medicine and College of Law. It offers afternoon, evening, extension and summer courses. The library contains about 13,000 volumes. There are about three thousand eight hundred students. The tuition is free to all residents of Cincinnati.

Cin'cinna'tus, hero of a Roman tradition. The Roman army were caught by the Æqui in a defile of Mt. Algidus, about 460 B. C., and Cincinnatus was appointed dictator. He received the news of the appointment while cultivating his farm across the Tiber. As soon as he heard of the desperate situation of the Romans he left his plow and started to save his country. Within 16 days he conquered the enemy, resigned the dictatorship and returned to his farm.

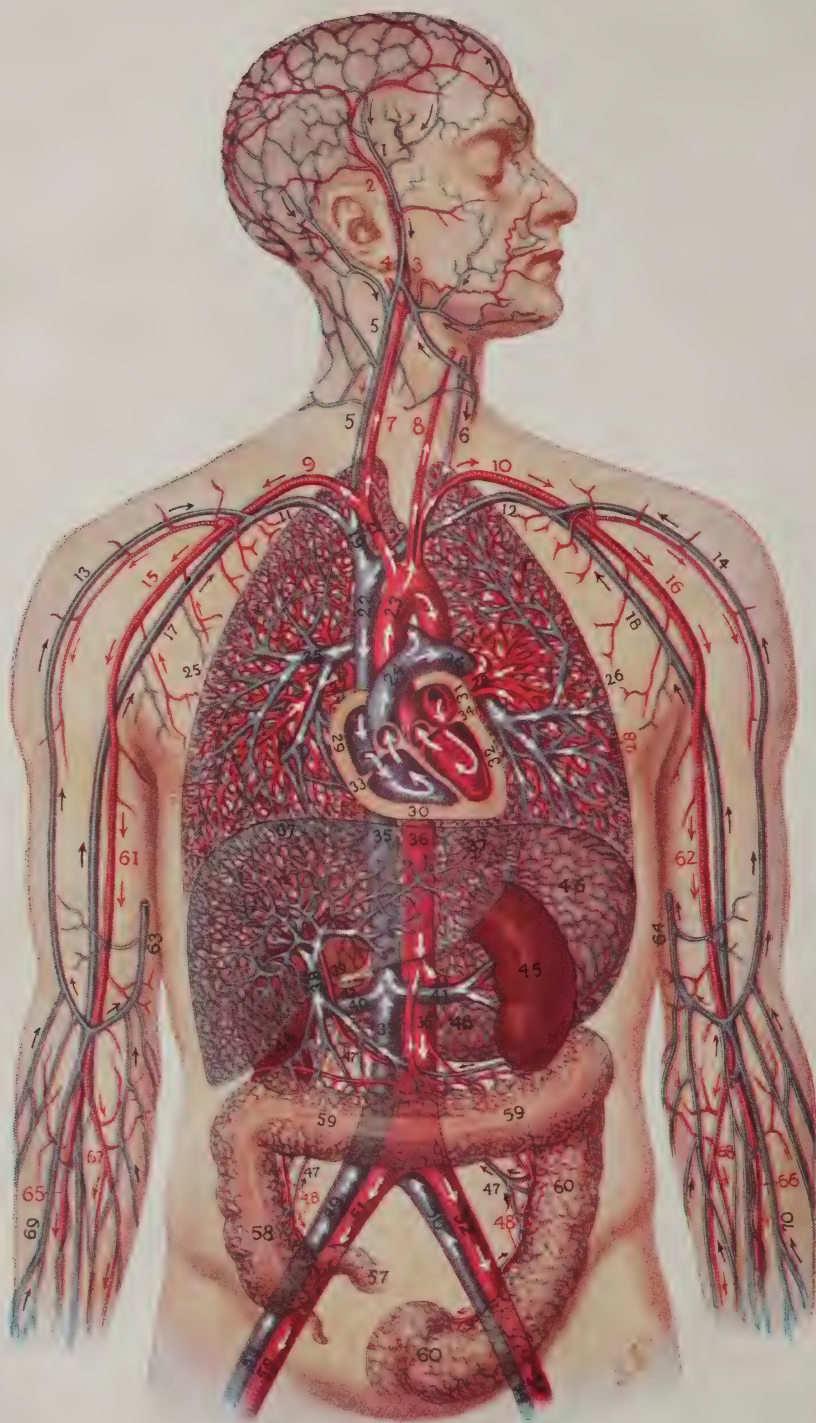
Cinnabar, *Sin' a bahr*, red sulphide of mercury. It occurs in earthy, granular

and massive forms and also in crystals, and is usually red, though sometimes of a brownish or leaden color. Cinnabar is the most important ore of mercury, and is found in Spain, Austria, Mexico and the United States, and in smaller quantities in other parts of the world. The impurities of the natural cinnabar render it unfit for pigment, but from artificial mercuric sulphide the vermilion of commerce is made. See MERCURY.

Cin'namon, the bark of a tree having an aromatic odor. The plant is of the same order as laurels, with oval leaves, yellow flowers and a cone-shaped fruit. The tree grows to heights of from 15 to 30 ft., and is chiefly found in Ceylon, but grows also in Malabar and other parts of the East Indies. Cinnamon bark is a staple article of commerce. It is used for culinary purposes, generally as a spice. The essential oil is produced from the roots, leaves and fruit, which, by the name of oil of cinnamon, is known to the trade, and is used largely to hide or disguise unpleasant tastes and odors in oils and articles made from waste products. It is sometimes used in medicine for ailments of the stomach. See SPICES.

Circassians, *Ser kash' anz*, a name given to the race of people of the Caucasus region. They are remarkable for their physical beauty, and are tall, with oval faces, brown hair and soft brown eyes. Their religion is chiefly Mohammedanism or a combination of Mohammedanism and Christianity. The principal tribes are the Adighe, or Circassians Proper, the Kabardians and the Abkhassians. The Circassians bravely resisted Russian oppression, but their country came under complete Russian authority in 1864. There are now about 150,000 Circassians in their native mountains.

Circe, *Sur' se*, a powerful enchantress of the Ææan Isle, who first feasted all comers, and then, by a subtle drink, converted them into animals. She thus made swine of half the crew of Ulysses; but the hero himself, fortified by Mercury with a white-flowered herb, resisted her sorceries and threatened her with death if she did not restore his comrades.



CIRCULATION OF THE BLOOD

It was Circe who deformed beautiful Scylla. See SCYLLA.

Circuit, Sur'kit, Court. Many states have a system of courts below the supreme court, known as circuit courts. In effect, all states have such courts but they are not always known by that name. A circuit is a judicial district, the presiding judge of which holds court at different places in his circuit according to a definite schedule. In the great majority of cases, an appeal lies from the decisions of the circuit court to the supreme court. For Federal purposes, the United States is divided into nine judicial circuits, each of which is under the nominal supervision of one of the justices of the supreme court. Formerly, there was in each circuit a circuit court presided over by two or three judges. The supreme court justice in charge of that circuit was generally one of the circuit court judges. These courts had both original and appellate jurisdiction as cases could originate in them or be appealed to them from the district courts.

CIRCUIT COURT OF APPEALS. In 1911 the circuit courts just described were replaced by the circuit courts of appeal, a strictly appellate court. The great majority of cases that seek the aid of the federal judicial power come to issue first in the district courts, though certain class of cases originate in the supreme court. Appeal lies from the district court to the circuit court of appeals in most cases, but some cases go directly to the supreme court for review. The decisions of the circuit court of appeals in cases that come before it for review are final in the majority of cases, though questions that arise in the consideration of some cases may be sent to the supreme court for settlement, and the entire case may then be called before that court.

Cir'' cula' tion, the flowing of the blood through the blood vessels. The movement of the blood in opposite directions was observed as early as the second century by the Greek physician, Galen; but the relation between the heart, arteries and veins was discovered by William Harvey in 1628. Thirty-three years

later Malpighi, examining the web of a frog's foot under microscope, discovered that blood passes from arteries to veins through capillaries. (The blood leaves the left ventricle of the heart (See HEART) under pressure of its contracting muscles, and passes into a large artery called the aorta and through its branches to all parts of the body except the lungs.) Passing through the capillaries it enters the veins and returns to the heart, emptying into the right auricle. From this it flows into the right ventricle, which pumps it into the pulmonary arteries. These carry it to the lungs, where it throws off the carbon dioxide, which it has absorbed in its passage through the body, and takes up oxygen. Returning to the heart it empties into the left auricle and moves on into the left ventricle, the point from which it started. The passage of the blood from the heart to the lungs and back again to the heart is called pulmonary circulation; its wider distribution throughout the body is called the systemic circulation. That portion of the blood which goes through the stomach and intestines passes through the portal vein and its capillaries and from there to the hepatic veins. These veins pour it into the inferior vena cava (See VEINS), from which it empties into the right auricle of the heart. This is called the portal circulation. The blood makes a circuit of the system in about 23 seconds, and the whole amount of blood passes through the heart every 37½ seconds. See BLOOD; LUNGS; ARTERIES.

The accompanying plate shows the organs of circulation, and also the direction in which the blood flows. The blood vessels carrying pure blood are colored red, those carrying the impure, blue.

KEY TO PLATE

1. R. Superficial Temporal Vein. 2. R. Superficial Temporal Artery. 3. R. External Carotid Artery. 4. R. Internal Carotid Artery. 5. R. External Jugular Vein. 6. L. External Jugular Vein. 7. R. Common Carotid Artery. 8. L. Common Carotid Artery. 9. R. Subclavian Artery. 10. L. Subclavian Artery. 11. R. Subclavian Vein. 12. L. Subclavian Vein. 13-14. R. & L. Cephalic Vein.

15-16. R. & L. Axillary Arteries. 17-18. R. & L. Axillary Veins. 19. R. Innominate Vein. 20. L. Innominate Vein. 21. R. Innominate Artery. 22. Descending Vena Cava. 23. Ascending Aorta. 24. Pulmonary Artery. 25. R. Pulmonary Artery. 26. L. Pulmonary Artery. 27. R. Pulmonary Veins. 28. L. Pulmonary Veins. 29. Heart-R. Auricle. 30. Heart-R. Ventricle. 31. Heart-L. Auricle. 32. Heart-L. Ventricle. 33. Heart Bicuspid Valve. 34. Heart Mitral Valve. 35. Ascending Vena Cava. 36. Descending Aorta. 37. Hepatic Veins. 38. Portal Vein. 39. Hepatic Artery. 40-41. R. & L. Renal Veins. 42-43. R. & L. Renal Arteries. 44. R. Kidney. 45. L. Kidney. 46. Stomach. 47. Mesenteric Veins. 48. Mesenteric Arteries. 49-50. R. & L. Common Iliac Veins. 51-52. R. & L. Common Iliac Arteries. 53-54. R. & L. External Iliac Veins. 55-56. R. & L. External Iliac Arteries. 57. Small Intestine. 58. Ascending Colon. 59. Transverse Colon. 60. Descending Colon. 61-62. R. & L. Brachial Arteries. 63-64. R. & L. Basilic Veins. 65-66. R. & L. Radial Arteries. 67-68. R. & L. Ulnar Arteries. 69-70. R. & L. Median Veins.

Circus, *Sur' kus*, a Roman word for *circle*. A circus was originally an enclosed race course four or five times as long as it was wide, with one end and side having a circular-shaped arena with seats around it like those in theaters and ball parks. Some were built of marble, and Pliny states that the Circus Maximus seated 260,000 people. The modern circus was formerly of one ring, with one singing clown, juggler, acrobat and bare-back rider, but it has since developed into an affair of immense magnitude, sometimes employing 3000 people. It has now at least two rings and various platforms, where five or six performances take place at the same time. It also has a number of animals, or a menagerie, all covered by a great canvas tent. The first performance in a town is usually preceded by a parade of the wagons, horses, performers and menagerie animals, with several bands. The development of the modern circus is, no doubt, due to the genius of Phineas T. Barnum, of Connecticut. See COLOSSEUM; BARNUM, PHINEAS TAYLOR.

Cistercians, *Sis tur' shans*, an order of monks founded in 1098 at Cistercium, now Citeaux, France, by Robert, the abbot of Moselme. It was a branch of the Benedictines and was severe in its rules.

After the order was joined by Bernardine, or St. Bernard, the monks were often spoken of as the Bernardines. The Cistercians built many great churches and monasteries noted for their simplicity and beauty, and they are ranked among the world's greatest builders. The Feuillants and the Trappists are branches of this order.

Cities of Refuge, the six cities appointed by the Mosaic Law for the refuge of anyone who killed a fellow creature accidentally or without design. These cities, Kedesh, Shechem and Hebron, on the west side of the Jordan, and Bezer, Ramoth-Gilead and Golan, on the east side, were given to the tribe of Levi, in the division of Canaan. The manslayer could flee to the nearest of these cities and there receive a fair trial. If found not guilty of willful murder he could remain in the city until the death of the high priest, when he could return to his home.

Cit'izen, a member of an organized political society. The term involves on one side allegiance to and support of the community, and on the other the protection of the citizen by the community. In the European monarchies the term is used to denote a dweller of a municipality, the citizen's relations to the State being expressed by the word *subject*.

Citizenship implies civil but not necessarily political rights. The former include all rights which are the primary obligation of a government to secure to its members; while political rights are varied and may be conferred at the discretion of the government. The Fourteenth Amendment passed by Congress in 1866 decrees that all persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the state wherein they reside. Minor children of duly naturalized parents receive citizenship by the act which naturalizes the parent, while a child born abroad of American parents is deemed a natural-born citizen (See NATURALIZATION).

One may formally renounce one's citizenship and become the subject of an-

other power, but it is not lost by residence abroad. Right to vote is temporarily lost by removing from one state to another, or from one voting precinct to another.

Citric, *Sit' rik*, Acid, a complex acid containing carbon and found in limes, lemons and citrons. It was discovered along with tartaric and malic acids by Scheele, who treated fruit juices with lime to investigate their constituents. It is colorless and has an extremely sharp, sour taste. Artificial citric acid is used in making lemonade, in place of the juice of the lemon.

Citron, *Sit' run*, an ornamental tree of the Rue Family, producing a fruit, which, preserved, is used in cookery. It belongs to the same genus as the lemon and orange and by many is believed to be a subspecies of lemon. The tree is small and erect, with globular top and thick foliage. The leaves are oval, pointed, somewhat fibrous, and are a shiny green on their upper surface but lighter and dull underneath. The flowers are fragrant and made up of many waxy-white petals surrounding many yellow stamens. The fruit is more nearly globular than the lemon but has the same thick, oily rind and juicy, several-celled fruit. The rind of the citron is preserved and on the market, for use in spicing desserts, cakes and drinks. The citron grows in sub-tropical countries in company with the orange and lemon.

In the United States the name citron is generally applied to a garden vine of the Rue Family bearing round, juicy melons. This citron is a creeping vine with three- or five-lobed leaves and large greenish-white flowers. The fruit is a globular juicy melon much like the ordinary watermelon, and its rind is preserved by American housewives for a relish or dessert.

Cit'rus, a class of small trees of the Rue Family, including such fruit-bearing trees as the orange, lemon, lime and citron. They are natives of India but are successfully grown in California and Florida. Farther north they are occasionally set out for ornament, but rarely at-

tain full size or bear any amount of fruit. The flowers are handsome and fragrant, with waxy petals surrounded by shiny, green foliage. The species of citrus are highly cultivated and hence not always easy to distinguish. See ORANGE; CITRON.

Civ'et, or Civet Cat, a carnivorous animal of the Civet Family. The whole animal has an elongated appearance, for its head is pointed, its body long and low hung, and its bushy tail is nearly the length of its body. The fur of the civet is soft and valuable; in color it is gray, with dark lines and spots in regular arrangement upon the sides. The hair along the ridge of the back is long and can be erected as that of the cat. Civets live in holes like foxes and feed upon frogs, insects, worms, birds and small Mammals. It is probable that at one time they inhabited Europe, but they are now known only in Africa and southwestern Asia. Civets secrete an oily substance of musky odor, also known as civet, which is very disagreeable to Western taste, but furnishes the Orientals with a highly prized perfume.

Civic Federation, National, an organization formed in 1901, having for its purpose the banding together of the ablest representatives of capital, labor and of public men in an educational movement for the solution of some of the most vital problems relating to social and industrial progress, to provide for the study and discussion of problems of great national importance and to crystallize the most enlightened public opinion on these problems. The organization includes several departments, as follows: (1) the Industrial Conciliation Department, which deals with strikes and lock-outs; (2) the Industrial Economics Department, organized to promote discussion of economic questions, such as wages and the cost of living; (3) the Employers' Welfare Department, composed of employers of labor; (4) the Woman's Welfare Department, composed largely of women interested in industrial organizations; (5) Wage Earners' Insurance Department; (6) Department on Uniform State Legislation; (7)

Department of Regulation of Combinations and Trusts; (8) Department on Regulation of Interstate and Municipal Utilities; (9) Pure Food and Drugs Department. The officers of the federation constitute an executive council, which manages the offices of the general association. Most of the work is done through the various departments, each of which has its executive committee.

Civics, National School of, a school founded by Mrs. E. H. Harriman of New York, for those who desire to study the administration of public business. It aims to enroll students from among four classes: college graduates who desire to enter upon social work or other forms of public service; postgraduate students who wish to supplement, by practical training, their studies in such subjects as politics, economics, sociology, law and journalism; accountants who wish to qualify for a scientific analysis of any public business; superintendents of schools, secretaries of boards of trade and the heads of civic organizations. The school hopes to further the work of applying scientific management to the administration of all public business; and a portion of its funds is devoted to the publication of material carefully selected with this special purpose in view.

Civil Laws, laws which the people of a state or nation enact to govern their business relations and the relations of their affairs in private life. In its broadest sense the term includes all laws pertaining to the private rights of citizens. Some authorities make no distinction between civil law and criminal law, but in their administration a distinction is made by the courts between civil justice and criminal justice.

Civil Rights Act, an act passed by Congress in 1866 with the protection of the Southern negroes as its object. This act, which was passed over President Johnson's veto, decreed all persons born in the United States, except Indians, and not subject to a foreign power, to be citizens of the United States, and gave them the right to hold property and to make contracts. A violation of the rights men-

tioned was made a misdemeanor, and to assure proper punishment the Federal authorities were given entire jurisdiction in all cases. The president was empowered to send United States officers into any state where violations were reported and to use the armed force of the government if necessary. Much ill-feeling resulted and in 1875 the act was repealed.

Civil Service, that branch of the public service which includes all executive offices not connected with the army or navy. As practically applied to the great departments of the Government of the United States, the term refers more especially to the appointive offices than to those filled by election. The Civil Service Act was passed in 1883, coming into full operation on the 16th of July during the administration of President Arthur, and was designed to remove many of the evils connected with the system of appointments. Provision is made for the appointment by the president of three civil service commissioners for terms of six years at annual salaries of \$3500 each, a chief examiner at \$3000 and a secretary at \$2500. It is the duty of the commissioners to aid in the preparation of civil service rules; in regulating and holding examinations and certifying results thereof; in making appointments and keeping records of all changes in the service. The commission remains permanently in Washington, D. C.

The fundamental principles of the civil service laws are: selection by competitive examination for all appointments to the classified service with a period of probationary service before absolute appointment; apportionment among the states and territories according to population of all appointments in the departmental service at Washington; and freedom of all employees of the government from any necessity to contribute to political campaign funds or to render political service. The classified service has grown, by the action of successive presidents, who have included various branches of the service within it, from 13,924 positions in 1883 to over 225,000 in 1911.

In order to provide registers of eligi-

bles for the various grades of positions in the classified service the commission holds annually throughout the country about 300 kinds of examinations, and in this work it is aided by local boards of examiners composed of three or more Federal employees, and located at the principal post offices and other government offices.

DIVISIONS OF THE SERVICE. These divisions are classed in five groups as follows: the departmental service, the customs service, the postal service, the government-printing service and the internal-revenue service. In point of numbers the departmental service is by far the largest and includes all employees whose appointments are not subject to the approval of the Senate and who are above the grade of laborer. The railway-mail service, the pension agency, the lighthouse service, the Indian service, the steamboat-inspection service, the life-saving service, the mints and assay offices, subtreasuries, etc., are all under the rules of the Civil Service Commission. The customs and internal-revenue service cover all employees connected with the collection of duties on imports and taxes imposed upon certain goods manufactured within the country, and the post office department includes all connected with handling the mails.

APPLICATIONS FOR POSITIONS. Applicants must be citizens of the United States—of the proper age. No discrimination is made on account of sex, color or political or religious opinions. The limitations of age vary with the different services; but the age limitations do not apply to any person honorably discharged from the military or naval service of the United States by reason of disability resulting from illness in the line of duty. Any person seeking appointment must first write to the Civil Service Commission in Washington for an application blank. After this blank is properly filled out it is returned to Washington or is sent the examining board in the city in which the applicant is to be examined as may be directed.

EXAMINATIONS. The applicants are

examined as to their relative capacity and fitness. The ordinary clerical examinations are used only for clerkships. The subjects are orthography, penmanship, copying, letter writing, the fundamental rules of arithmetic and the proper construction of sentences. The examinations relate as nearly as possible to the duties to be performed and whenever practicable include experience and practical tests. No one is certified for appointment whose standing in the examination is less than 70 per cent of complete proficiency, except that applicants claiming naval or military preference need obtain but 65 per cent. The law also prescribes competitive examination for promotion in the service. Each person who takes the examination receives a certificate stating whether he passed or failed in the work.

APPOINTMENTS. All competitors who are eligible to appointment have their names enrolled in the order of general average upon the proper registers. The names remain upon the eligible register for two years from date of enrollment, and any person whose name thus appears may accept temporary appointment without losing his position on the register of eligibles.

SALARIES. The departmental service is usually entered in the lowest grades, the higher grades being generally filled by promotion. The entrance grade is about \$900, but the applicant may be appointed at \$840, \$760 or \$600. See SPOILS SYSTEM.

Civil War in America, the struggle between the Southern States and the Northern States of the Union, 1861 to 1865. Ever since the Missouri Compromise, 1820, the social and economic differences between the North and South, due mainly to the issue of slavery, had been increasing. Affairs came to a crisis with Lincoln's election; immediately South Carolina seceded and on Dec. 20, 1860, declared itself a "free and independent nation." By Feb. 1, 1861, Mississippi, Florida, Alabama, Georgia, Louisiana and Texas followed this example, and when delegates from the seceding states met in a provisional congress at

Montgomery, Ala., Feb. 4, they formed the Confederate States of America. Jefferson Davis became president, and Alexander H. Stephens vice-president. See UNITED STATES, subhead *History*; NULLIFICATION; STATES' RIGHTS; CONFEDERATE STATES OF AMERICA; SLAVERY. For contemporary political events, see articles on important civil leaders.

The North and the South had at first each expected a quiet separation. President Buchanan's attitude in the matter was uncertain, and Lincoln for a time was undecided what course to follow. But after Ft. Sumter, in Charleston Harbor, S. C. (See FORT SUMTER), had been fired on, Apr. 12, 1861, President Lincoln called out 75,000 militia, Apr. 15, and declared a blockade of all Southern territory. The Confederacy likewise called for volunteers, and President Davis gave letters of marque to owners of vessels.

During these preparations Virginia, Tennessee, Arkansas and North Carolina left the Union. The attitude of the border states, Missouri, Kentucky, Maryland and Delaware, was a great factor in determining along what lines the armies were to move. Though they remained in the Union, these states furnished reinforcements to both sections.

FIRST YEAR: During the first year of the war the land operations were chiefly concerned with the attack and defense of Washington, and the principal engagement took place at Bull Run. This resulted from General McDowell's attempt to open a campaign for capturing Virginia, and was a Federal defeat. The command of the army was then given to General McClellan, who had been winning success in western Virginia, and for the next few months he organized and trained his men. However, other battles of the first year were those of Big Bethel and Ball's Bluff, both disastrous to the Union, and that at Wilson's Creek, in which General Lyon lost his life but which saved Missouri for the Federals.

SECOND YEAR. In the West, in 1862, Thomas, Buell, Pope and Grant practically cleared for the Union the upper

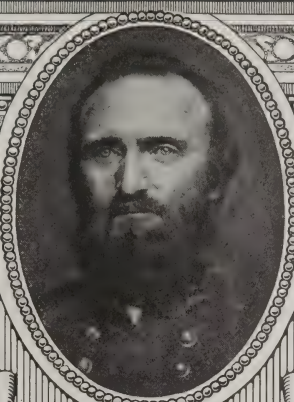
Mississippi River, with the lower part of the Cumberland and the Tennessee. To accomplish this, a battle was fought at Mill Spring; forts Henry and Donelson were attacked and captured by Grant and Commodore Foote; engagements took place at Shiloh, where the Confederate general, A. S. Johnston, was killed, and at Corinth. On Apr. 25 New Orleans fell to General Butler and Admiral Farragut.

In the East, in the meanwhile, Lee defeated McClellan and the Army of the Potomac, with which he had fought the four months' Peninsula Campaign to capture Richmond. On the old battlefield of Bull Run Lee later defeated Pope, who likewise had undertaken a campaign against the Confederate capital, and then advanced into the border State of Maryland as far as South Mountain. On Sept. 16 and 17 Lee and McClellan, who had been restored to the Union command, fought the Battle of Antietam, where his defeat forced Lee to relinquish the idea of invading the North and to withdraw into Virginia. Following the engagement Lincoln issued the preliminary Emancipation Proclamation, Sept. 22, and McClellan, because of his irresolution and slowness and for not having attacked Lee's army as it withdrew, was superseded by Burnside. The latter met the Confederates on Dec. 13, at Fredericksburg, where he was defeated with a loss of 13,000 men. Previously, March 9, the first fight of ironclads, between the *Monitor* and the *Merrimac*, occurred in Hampton Roads. See HAMPTON ROADS, BATTLE OF.

THIRD YEAR. The year 1863 was the crucial year of the war. Burnside was succeeded by Joseph Hooker, whom Lee disastrously defeated at Chancellorsville, May 2-5. Now assuming the offensive, Lee made a second march to the North, invading Pennsylvania in the hope of threatening Philadelphia. But Hooker was suddenly relieved by Meade. The Battle of Gettysburg, July 1-3, was the pivotal engagement of the war. Their defeat caused the Southern forces to retire into Virginia with losses from which



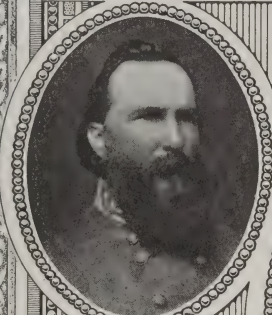
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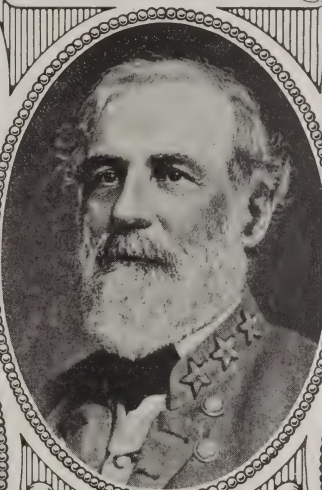
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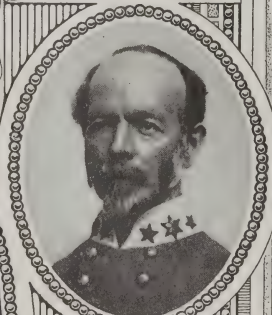
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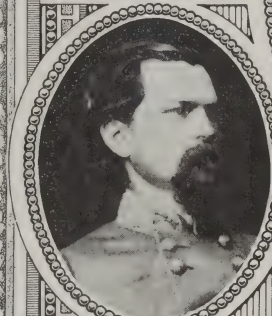
JAMES LONGSTREET



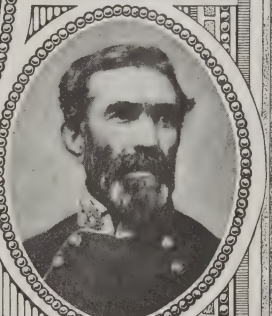
ROBERT E. LEE



JOSEPH E. JOHNSTON



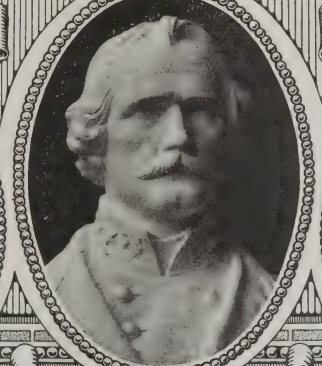
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BRAXTON BRAGG



GEORGE E. PICKETT

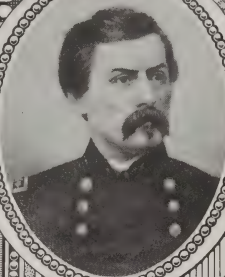


ALBERT S. JOHNSTON



JAMES E. B. STUART

CONFEDERATE GENERALS



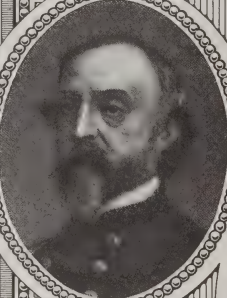
Geo. B. McCLELLAN



WM. T. SHERMAN



Jno. M. SCHOFIELD



Geo. G. MEADE



JOSEPH HOOKER



ULYSSES S. GRANT



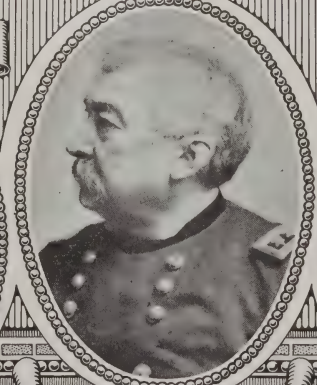
Geo. H. THOMAS



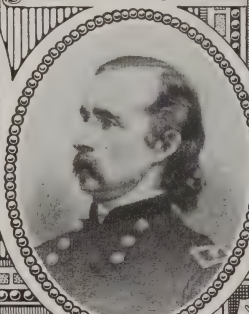
OLIVER O. HOWARD



WINE. S. HANCOCK



PHILIP SHERIDAN



Geo. A. CUSTER

UNION GENERALS

the Confederacy was never able to recover. Meanwhile, Grant had taken Vicksburg on July 4, after a long siege and bombardment. Port Hudson soon surrendered and the Mississippi was opened. The western armies then concentrated their energies upon capturing the central highlands of Kentucky and Tennessee, the heart of the Southern territory. Rosecrans had here previously defeated Bragg, Dec. 31, 1862, at Murfreesboro, but his own Army of the Cumberland had been almost annihilated by the Confederates at Chickamauga, the following September. Grant was now put in charge of the campaign, Thomas having immediate command at Chattanooga. Sherman arrived from the Mississippi and Hooker from the Potomac, and the Union army attacked Bragg, stationed on Lookout Mountain and Missionary Ridge, heights surrounding Chattanooga. In "one of the most spectacular encounters the world ever saw," Nov. 23-25, Bragg was defeated, and, barring a few lesser engagements, the West was no longer a field of contention.

FOURTH YEAR. The following February Grant was placed in command of all the armies of the Union and assumed personal charge of the Army of the Potomac. In a series of several battles, at the Wilderness, May 5 and 6; at Spottsylvania Courthouse, May 8 to 21; at North Anna River, May 23 to 26; and at Cold Harbor, May 31 to June 12, he forced Lee back upon Richmond and, having lost 60,000 veterans in his overland campaign, began the siege of Petersburg. Sherman, in the meantime, leaving the central highlands, had effected his celebrated march through Georgia to Atlanta, which he entered on Sept. 2, and had reached Savannah, which he occupied on Christmas Day. While this general campaign was progressing, Sheridan's cavalry had driven Early from the Shenandoah Valley. Hood, hoping to swerve Sherman from his proposed march, had marched north and, on Dec. 15, had encountered Thomas at Nashville. The Confederate army was completely destroyed. Moreover, on the sea,

the Confederate privateer *Alabama* had been sunk by the United States vessel *Kearsarge* on June 19, in the harbor of Cherbourg, France, and Farragut had won the battle of Mobile Bay, Aug. 5.

FIFTH YEAR. On Feb. 1, 1865, Sherman left Savannah to cooperate with Grant in the last campaign of the war; but Grant, who had been besieging Petersburg and Richmond for almost a year, could not wait for Sherman to strike the final blow. Thus on Apr. 1, Sheridan successfully attacked the Confederates at Five Forks. The following day the inner works at Petersburg fell, and on the night of the second Lee evacuated Richmond. Grant occupied the city and immediately set out in pursuit, overtaking the Confederates at Appomattox Courthouse, where, on Apr. 9, Lee surrendered. Johnston surrendered to Sherman on Apr. 26, on May 10 Jefferson Davis was captured and later confined in Fortress Monroe, and by the end of the month the entire Confederate army was disbanded.

The great joy at the termination of the war was turned into immediate grief by the assassination of President Lincoln on Apr. 14. At various times the struggle had commanded the services of over 4,000,000 men all told, nine out of every ten Southerners and four out of every ten Northerners serving for an average of three years. Towards the close of the war there were 1,000,000 Federals and 450,000 Confederates in the field. The total loss of life was considerably over 600,000, the lives sacrificed by the North and South being, respectively, about 360,000 and 260,000. This includes loss from wounds, disease and other causes. The war cost the North \$3,550,000,000; the Confederacy, about \$2,000,000,000. Including \$3,000,000,000 in pensions paid to Union soldiers, but excluding property losses, the war cost both sections over \$9,000,000,000. The Civil War was "the most gigantic conflict of modern times," and that at its close the two armies should turn so peacefully from the field to civil life "was not the least of its marvels."

See articles on the principal battles, generals and statesmen; also, **POLITICAL PARTIES IN THE UNITED STATES.**

Claiborne, Kla' born, William (1589-1676), a Virginia colonist and secretary of state, born in Westmoreland, England. He came to Jamestown, Va., in 1621 and soon secured possession of 45,000 acres of land. In 1631 he opened a trading post on Kent Island in Chesapeake Bay, not far from the present city of Annapolis. His claim to this island was disputed by Lord Baltimore, and the controversy led to what is known as Claiborne's Rebellion, in which Claiborne and his fellows were defeated.

Clairvoyance, Klar voy'ans, the power of discerning things not ordinarily perceptible. Some claim to possess this attribute as a special gift; others obtain it only upon going into a hypnotic state. Professional clairvoyants claim, by means of this gift, to locate lost articles, to prophesy, to give advice upon all questions not easily settled because of lack of information, and in many cases to hold communication with the absent. Although not held in high repute at present, clairvoyance, no doubt, has hastened the period of psychological investigations which are rapidly advancing the practical knowledge of psychic manifestations.

Clam, a name given to various families of Mollusks having bivalve, or hinged, shells. The majority are edible and are greatly valued, especially so in eastern United States. Probably the best known is the Venus clam, which is variously known as round clam, hard-shelled clam or quahog. The young are known as "little necks." They are found widely distributed along coasts with sandy bottoms, where they may be seen standing upon the edge of the thick, oval shell; they rarely burrow. The hinge has three teeth, and the two valves of the shells are fastened together by a tough, external ligament. This family of clams is extremely large, and zoologists disagree as to its classification. The soft clams, which are also a desirable food and are the basis of the Easterners' clam chow-

der, have soft, chalky shells. They lie buried to the depth of one foot or less in the sand along the shores, where their location on the beach is recognized by the openings from which their siphons protrude. Soft clams are found upon both shores of the United States and along certain beaches of Great Britain. Gathering them for the market is an industry of no slight importance, since the demand for clams is steady and large. They are locally called sand clam, sand gaper and old maid. Other species are the small basket clams of the West Indies, the surf clams of the tropics and the rock borers which work harm to embankments and breakwaters. See **MOLLUSCA.**

Clapp, Moses Edwin (1851-), a United States senator, born in Delphi, Ind. In 1857 he moved with his parents to Hudson, Wis. He attended the common schools and graduated in 1873 from the Wisconsin University Law School. In 1878 he was elected county attorney of St. Croix County, Wis., and in 1881 he moved to Fergus Falls, Minn., where he resided until 1891. He was elected attorney-general of Minnesota in 1887 and served in that office six years. Mr. Clapp first went to the United States Senate in 1901 to fill the vacancy made by the death of Senator Davis, and was twice reelected. He identified himself with the progressive wing of the Republican Party.

Clar'endon, Edward Hyde, EARL OF (1609-1674), an English statesman and historian. On the death of his elder brother he left Oxford and studied at the Middle Temple. He preferred literature to law, however, and associated with such choice spirits as Falkland and Ben Jonson. He entered Parliament in 1640, and the next year joined the King's Party and drew up the "Grand Remonstrance." He became chancellor and in 1645 accompanied the Prince of Wales to the west of England and thence to Jersey. It was at this time that he commenced his *History of the Rebellion in England*. After the Restoration he was created Baron Hyde and, later, Earl of

Clarendon, while he was confirmed as high chancellor. He was removed from office in 1667 and banished for high treason. He lived in Rouen, France, the rest of his life.

Clar'inet", a musical wind instrument, consisting of a mouthpiece and a cylindrical tube terminating in a bell. The mouthpiece contains a thin reed which produces the tone, and the tube has a number of holes on the side covered with keys which are operated by the fingers to produce the melody. The lowest note is E below the F clef, and it produces tones above a third octave in the hands of a skillful performer. Clarinets are commonly attuned to the keys C and F.

Clark, Champ (James Beauchamp) (1850-1921), an American statesman, born at Lawrenceburgh, Ky., and educated at Bethany College and at the Cincinnati Law School. Admitted to the Missouri bar in 1875, he began to practice at Bowling Green, Mo., in 1880. Taking an active interest in politics, he filled various offices in his county and state, and in 1893 was elected to Congress as a Democrat. During years of almost unbroken service there, he acted on the House committee on foreign affairs and on the committee on ways and means and was minority leader from 1908 to 1911, in which latter year he was chosen speaker. Mr. Clark was permanent chairman of the Democratic National Convention in 1908. In 1912 he was an unsuccessful candidate for the presidency, but in the fall election of that year was reelected to Congress.

Clark, Charles Heber (1841-1915), known also by his pen name of Max Adler, an American author, born in Berlin, Md. For ten years he was secretary of the Manufacturers' Club in Philadelphia, Pa., editing the club's official journal. He also wrote in a humorous vein; among his works are *In Happy Hollow*, *Desperate Adventures*, *The Quakeress*, *Out of the Hurly Burly* and *Captain Bluit*.

Clark, Francis Edward (1851-), clergyman and author, born at Aylmer,

Quebec. He graduated from Dartmouth College in 1873, and from Andover Theological Seminary in 1876, becoming that year pastor of Williston Congregational Church, Portland, Me., and of Phillips Church, South Boston, in 1883. While pastor in Portland he founded the Society of Christian Endeavor, which has since spread throughout Christendom. In 1887 he became president of the United Society of Christian Endeavor. In the interests of this work he has edited the *Christian Endeavor World*, and has traveled around the world five times. He has written numerous books, mostly bearing upon Christian Endeavor work or his travels. See CHRISTIAN ENDEAVOR, THE UNITED SOCIETY OF.

Clark, George Rogers (1752-1818), an American soldier and pioneer, born in Virginia. Early in life he became a surveyor and took part in Lord Dunmore's War with the Indians, 1774. The following year he surveyed Kentucky, whither he removed in 1776, soon becoming a leader among the frontiersmen and conspicuous in having Kentucky organized as a separate county. Having suggested to Patrick Henry, governor of Virginia, an expedition to capture the English forts on the Ohio and the Great Lakes, he was commissioned lieutenant-colonel, January, 1778, and furnished with such means as enabled him to go down the Ohio from Ft. Pitt with some 175 men in the spring of 1778. By May he had reached Louisville and easily took Kaskaskia and Cahokia, and, in July, Vincennes. Colonel Hamilton, British commander at Detroit, recovered Vincennes in December, but Clark surprised and regained it the following February. Barring Detroit and several other positions along the Canadian border, he had thus captured the entire Northwest for the Americans.

In 1780 Clark built Ft. Jefferson on the Mississippi, near the mouth of the Ohio, and to avenge a raid on Kentucky by Indians and Canadians, destroyed the Indian villages Chillicothe and Pequa. Moreover, while in Richmond, obtaining approval for his pro-

posed capture of Detroit, he accepted a command under Von Steuben to defend Virginia against the British. Two years later he marched a large force against Indian towns on the Miami and Scioto, five of which he destroyed. In July, 1783, Virginia relieved him of his command, whereupon he retired to the tract of land which that state had granted him at Clarksville, Ind., near Louisville, Ky. Some ten years later, however, he was commissioned a major-general in the French army to recapture Spanish possessions on the Mississippi for the French; but with the recall of Genet the plan was dropped. He died in obscurity and poverty.

Clark's conquest of the Northwest was an inestimable service to the United States; for, during the peace negotiations after the Revolution, it was the principal basis of American claim to the land from the Alleghenies to the Mississippi.

Clark, William (1770-1838), an American explorer, famed for connection with the Lewis and Clark Expedition to the Pacific, born in Caroline County, Va. In 1784 he removed to Louisville, Ky., later fought the Indians under Wayne, from 1796 to 1803 was retired from the army, and the following year, jointly with Meriwether Lewis, commanded an exploring expedition to the Northwest (See LEWIS AND CLARK EXPEDITION). Subsequently he was brigadier-general of militia for Upper Louisiana Territory, from 1813 to 1821 governed Missouri Territory and from 1822 until his death was superintendent of Indian affairs in St. Louis.

Clarke, William Robinson (1829-1912), Canadian Anglican clergyman and educator, born at Inverurie, Scotland, and educated at Aberdeen, and at Hertford College, Oxford. He was curate of St. Mathias, Birmingham, in 1857, and vicar of St. Mary Magdalene at Taunton, 1859. Dr. Clarke came to Canada in 1882 and that year was appointed professor of philosophy in Trinity College, Toronto, a position he continued to hold until 1908. In 1887 and

again in 1899, he was lecturer at the University of Michigan. In 1900 he was elected president of the Royal Society of Canada. He was widely known as a writer and as a public speaker and lecturer. For some years he was editor of the *Canadian Churchman*. His principal publications were: *Witnesses to Christ, Savonarola, The Anglican Reformation and Pascal and the Port Royalists*.

Clarke, James Freeman (1810-1888), an American clergyman, born at Hanover, N. H. He graduated from Harvard College in 1829 and from Cambridge Divinity School in 1833. He was pastor of the Unitarian Church in Louisville, Ky., and editor of the *Western Messenger*. In 1841 he founded the Church of the Disciples (Unitarian) in Boston, of which he was pastor from 1841 to 1850 and from 1853 until his death. For many years he was an overseer of Harvard, where he was professor of natural religion and Christian doctrine in 1867-71, and lecturer on ethnic religions in 1876-77. Besides his many contributions to current journals, he published many works, including *Eleven Weeks in Europe, Essentials and Non-Essentials in Religion, Orthodoxy: Its Truth and Errors* and *Ten Great Religions*.

Clarksburg, W. Va., a city and the county seat of Harrison Co., 82 m. e. of Parkersburg, on the west branch of the Monongahela River and on the main line of the B. & O. railroad. The surrounding district is rich in natural gas, coal, oil and other natural resources, and there are valuable farm, grazing and timber lands. Clarksburg is called the "fuel city of the fuel state." The manufacturing and other industrial establishments include glass and art-pottery factories, chemical and carbon works, cigar factories, foundries, machine shops, bottling works, sheet and tin-plate mills, zinc mills, an enamel ware plant, a casket factory and flour mills. There are three hospitals in the city. Among the educational institutions are St. Joseph's Academy, a Roman Catholic school, and the West Virginia Business College.

Clarksburg was the birthplace of "Stone-wall" Jackson. Settled in 1772, the place was incorporated in 1849 and has a city manager form of government under a charter of 1921. Population in 1920, 27,869.

Clark's Fork, or Flathead River, a branch of the Columbia River, rising on the western slopes of the Rocky Mountains in Montana and flowing northwest through Idaho to the boundary of Washington and British Columbia. It is about 700 m. long and is formed by the Hell Gate, Big Blackfoot and Bitter Root rivers. In its upper course it is spoken of as the Missoula.

Clarksville, Tenn., a city and the county seat of Montgomery Co., 45 m. n.w. of Nashville, near the junction of the Cumberland and Red rivers, and on the Illinois Central and the Louisville & Nashville railroads. It is situated in the tobacco belt,—locally known as the "black patch"—and is one of the most important tobacco markets in the United States, the annual trade in this commodity approximating in value \$5,000,000. The region is also adapted to the cultivation of vegetables, wheat and Indian corn and to stock raising. Among the natural resources are iron ore and timber, poplar, birch and oak being the principal woods. The factory output is considerable; in addition to various forms of tobacco—chewing tobacco, smoking tobacco and snuff—are lumber products (including furniture), iron, agricultural tools, flour and pearl buttons. At Clarksville is located the Southwestern Presbyterian University, founded in 1875; the public schools are excellent and modernly equipped. The place was settled in 1780 and five years later was incorporated; it is administered under a revised charter of 1891. Population, 1920, 8,110.

Classification. See BOTANY.

Claude Lorrain, *Klod Lo rane'*, or **Claude Gelee** (1600-1682), a French landscape painter, born in the village of Champagne. Left an orphan at the age of 12 years, he went to live with his brother, a wood carver, at Freiburg on the Rhine. Later he went to Rome,

thence to Naples, where he remained two years in the studio of a landscape painter of repute. Returning to Rome, he was hired by the painter Agostino Tassi to grind his colors and to do household drudgery. After this he made a tour of Italy, France and Germany. In 1627 he again returned to Rome and won immediate recognition. Claude was a diligent student of nature, working in the fields from sunrise to sunset, and, although always unlettered, he gained from observation of the phenomena of nature the precise and exact knowledge of the natural scientist. His aerial perspective and luscious tints were beyond anything that had hitherto been conceived, and he holds rank with the few great landscape painters of the world. Choice examples of his work are to be found in the National Gallery and in the Louvre and also in the Altieri and Colonna palaces in Rome.

Clax'ton, Philander Priestly (1862-), an American educator, born in Bedford County, Tenn. He graduated at the University of Tennessee in 1882, and pursued graduate courses in 1884-85 at Johns Hopkins and in 1885-86 in Germany, meantime serving for one year as superintendent of schools at Kinston, N. C. After returning from Germany he was superintendent from 1886 to 1888 at Wilson, and for five years at Asheville, when he was made professor of pedagogy and German in the North Carolina State Normal and Industrial College. After 1896 he was also director of the practice and observation work by students of this school. In 1897 he again visited Europe and inspected the schools of several countries. He received the degree of Litt. D. from Bates College in 1906. From 1902 to 1911 he was professor of education in the University of Tennessee, where he gave special attention to the needs of high schools and to their inspection. Dr. Claxton edited the *North Carolina Journal of Education* from 1897 to 1901 and the *Atlantic Educational Journal* during the two succeeding years, has held important positions in various scientific and educational soci-

eties, and since 1902 has been director of the Summer School of the South at Knoxville. In 1911 he was appointed commissioner of education of the United States.

Clay, an earth composed chiefly of silica and aluminum, with small quantities of lime, magnesia, potash and iron. When moist, clay is plastic and can be fashioned into almost any shape. When dry it is hard and brittle, but the best varieties, when burned, are so hardened that they retain their form under more or less severe usage. These qualities make clay valuable in the arts, and it is used for a variety of purposes. See **BRICK**; **POTTERY**; **TERRA COTTA**.

There are numerous varieties of clay, named from its use or composition. Pure clay, or kaolin, is extremely rare and is found in the largest quantities in China (See **KAOLIN**). Potter's clay and pipe clay contain more impurities than kaolin and are chiefly used in the manufacture of crockery. Brick clay is used in making bricks and tile; fire clay withstands high temperature without injury and is used in making fire brick, for lining smelting furnaces and other chambers where great heat is required. Loam is a clay containing sand and other ingredients. It forms one of the most valuable soils. Other common varieties are marl, tripoli and fuller's earth.

Clay is a valuable constituent of soils because it absorbs ammonia and other gases and vapors from manure and other fertilizers and enables the plants to feed upon them. Soil without a certain proportion of clay is of little value for agriculture, since it soon loses its fertility.

Clay, Cassius Marcellus (1810-1903), an American statesman, born in Madison County, Ky. He was educated at Yale College, graduating in 1832. He practiced law in Kentucky, became a member of the State Legislature and in 1845 established an anti-slavery paper, *The True American*. Clay served with credit in the war with Mexico, when he was taken prisoner. He was influential in the election of both Taylor and Lincoln. In 1861 he was minister of Russia;

but he was called home the following year and was made major-general of volunteers. He resigned his commission in 1863 and returned to his post in Russia, where he remained until 1869. In 1872 he supported Greeley; and, in 1876, Tilden, but joined the Republican supporters of Blaine in 1884. In 1896 he supported the Gold-Standard wing of the Democratic Party.

Clay, Henry (1777-1852), an American statesman, born in Ashland, Va., in a district known as "The Slashes." He received little education, although he was a great reader during the earlier part of his life. He obtained a position in the office of the clerk of the Court of Chancery at the age of 15, studied law and in 1797 was licensed to practice. He opened his office at Lexington, Ky., where his remarkable ability as a speaker and especially as an advocate before juries, soon brought him a flourishing practice. He was elected to the State Legislature in 1803 and appointed to fill an unexpired term in the United States Senate in 1806, where he immediately became prominent as an effective debater. He was again elected to the State Legislature in 1808 and sent to the Senate for another unexpired term of two years in 1809.

In 1811 Clay was elected to the House of Representatives and served for five successive terms until 1821, during practically all of which time he was speaker of that body. In connection with the other younger members of the House he forced the War of 1812 and made speeches in favor of it which aroused great enthusiasm throughout the country. He was one of the American peace commissioners in 1814. After an interval of two years spent in private life, Clay was again elected to Congress in 1823 and again chosen speaker of the House. In 1825 he became secretary of state under John Quincy Adams. He served in the United States Senate from 1831 to 1842, and from 1849 until the time of his death.

Clay was always a strong advocate of internal improvements by the Federal Government, being therefore classed as a "loose constructionist" of the Constitu-

tion. In a number of notable speeches he urged the recognition of the independence of the struggling republics of South America. He favored the preservation of the Union at any cost, and was the author and advocate of so many measures of compromise between the North and the South that he was called the "Great Compromiser" and the "Great Pacificator."

Clayton-Bulwer Treaty, a treaty between the United States and Great Britain, signed on Apr. 19, 1850, after prolonged negotiations between Secretary of State John M. Clayton, on one side, and Sir Henry Bulwer, special British ambassador to America, on the other. It related to establishing communication between the Atlantic and Pacific oceans by means of a ship canal across Nicaragua, and forbade the exclusive control of communication by either party. Because of disputes and misunderstandings between the parties to the convention, the treaty was modified at various times. The last of these controversies arose in 1881. In 1901 this treaty was set aside by the Hay-Pauncefote Treaty. See PANAMA CANAL.

Clearing House, an institution maintained by various banks of a city for exchanging and settling checks. From its depositors, its out-of-town correspondents, and in various other ways, a bank receives checks drawn on other banks in the same city. Under modern conditions it would involve much time and danger for each bank to send around to all of the other banks and collect on these checks, as was formerly done. The banks have therefore devised the clearing house, by means of which each can settle its checks with all of the other banks of the city by a single payment instead of adjusting its claims with them separately. At a given hour of the day each bank sends a representative to some central place where he meets similar messengers from all of the other banks, turns over to them the checks drawn against them, receives those drawn against his own, and gives or takes, as the case may be, the resulting balance. While the purpose

of the clearing house is everywhere the same, the method of conducting it varies in different cities, from a simple exchange of checks and balances in a small city to the formal institution maintained in a large metropolis. In cities like New York and Chicago, the procedure is practically as follows:

A permanent place of meeting is maintained, with a manager and assistants. To this place, at a given hour in the forenoon, each bank sends its checks against the other banks, in charge of a settling clerk and an assistant. As the clerk enters the clearing house, he hands to the manager a slip showing his total claims against the other banks, and takes his place at the desk assigned to his bank; while the manager enters the account to the credit of the bank in column 3 of his balance sheet. At a given signal the assistant clerk of each bank passes around to the desks of all the other banks in order, and leaves the bundles of listed checks against them, taking receipts therefor. Each settling clerk then strikes a balance with the several banks, and sends a slip to the clearing-house manager, showing the totals together with the resulting debit or credit balance. The manager enters the claims in column 2 of his balance sheet as debits against the respective banks, and enters the credit balances in column 4 and the debit balances in column 1. If no errors have been made columns 2 and 3 will balance each other, as will also columns 1 and 4. At a specified time later in the day the messengers return and adjust their balances with each other through the clearing house by the payment of cash, or by means of clearing-house checks made against cash deposits kept there for that purpose. This operation is repeated every business day of the year.

Clearing houses have come to perform other functions besides the mutual adjustment of balances, especially in the more important financial centers. They enable the banks to act together and to establish rules for the protection of conservative banking. Only such banks as observe these regulations can secure membership

in the clearing-house association. In times of financial stringency the stronger banks have often aided the weaker ones through this agency and have thereby averted more serious panics. During the money shortage of 1907 many clearing houses issued checks payable to bearer and guaranteed jointly by all the banks in the association, thus providing an emergency currency until the stringency passed.

The clearing-house system originated in France in the 17th century; but present methods were first inaugurated by the London clearing house, which was established about 1775. By far the most important clearing house in the United States is that in New York City, organized in 1853. Its clearings for the year ending Dec. 31, 1921, were \$194,331,219,662.99. Chicago follows second, with \$25,974,692,057.00. The clearing house system is also greatly developed in England, and in all the British Colonies. The immense saving of time and labor is seen from the fact that of the enormous amounts involved only about four per cent is usually paid in actual money. See BANKS AND BANKING.

Cle'burne, Tex., a city and the county seat of Johnson Co., 54 m. s.w. of Dallas, on the G. C. & S. F., the M. K. & T., the T. & B. V. and the D. C. & S. R. R., and is connected with Dallas and Fort Worth by an electric line. It is in the midst of a rich farming, fruit-growing and stock-raising region, and has foundries, railway repair shops, cotton gins, flour mills and the largest peanut mill in the world. The leading institutions of the city are a Carnegie library and St. Joseph's Academy (Roman Catholic). The place was named after Patrick Ronayne Cleburne, a major-general of the Confederate army. Pop. in 1920, 12,820.

Clem'atis, a name given to a number of climbing or twining, woody plants of the Crowfoot, or Buttercup, Family. The most common species is the virgin's bower, which has clusters of small greenish-white flowers in the late summer. After the flowers fall, the long-tufted seed pods cling to the stem and give it

the name "old man's beard." The leaves are made up of three coarsely-cut leaflets, dark green in color. Many species grow in America along roadsides. The purple clematis is less common, and bears larger, single flowers. The marsh clematis, which grows more commonly in the South, also has single flowers, but they are of a lighter shade and fragrant. The leather flower is a clematis, named from its leathery sepals, and is a more woody species. Some varieties of clematis are cultivated as porch climbers for their abundant, ornamental flowers.

Clémenceau, *Kla'mahn so'*, **Georges Benjamin Eugène** (1841-), a French politician and statesman, born at Mouilleron-en-Pareds. Having studied in Paris for the medical profession, he settled in Montmartre in 1869. His interest in the affairs of State, however, soon brought him into public life; in 1871 he became a member of the National Assembly, and, a few months later, president of the Municipal Council. In 1876 he was elected a member of the Chamber of Deputies, soon after becoming a leading spirit in the opposition against Gambetta and Ferry. In 1892 he lost his public influence and positions on account of his connection with the Panama affair. In 1902, however, he was elected a member of the Senate, and sat with the Socialist Radicals. Following this he undertook the direction of his journal *L'Aurore*, using it to lead the campaign for the revision of the Dreyfus case and for the separation of Church and State. In 1906 Clémenceau became minister of the interior. Breaking away from the Socialist Party, he became premier the same year. Defeated for the Presidency in 1919, he retired to private life. At the Peace Conference following the World War, he took a most prominent part in formulating the peace treaty.

Clem'ens, Samuel Langhorne (1835-1910), an American novelist and humorist, better known by his pen name of Mark Twain, a name derived from the calls he heard as a boy when soundings were being taken on the Mississippi.

He was born in Florida, Mo. Growing up on the lonely wastes of the sparsely settled Middle West, he came in close contact with pioneer life and learned to recognize that the hard conditions of living were bringing out the best primitive virtues of courage and honor among his associates, and this idea is reflected in almost all the writings of his mature years. He had little formal education, and soon became an apprentice to a printer. His heart was on the romantic Mississippi River, however, and in 1851 he forsook the trade and became a pilot. He was in the war, but gave no active service, and he later became a newspaper reporter in Nevada. After trying mining and going to San Francisco, he visited the Sandwich Islands and gradually became recognized as a writer and a lecturer. He traveled abroad, edited the *Buffalo Express* for two years and then settled in Hartford, Conn. In 1894 he witnessed the failure of the publishing house, Webster & Company, with which he was connected, and gave a series of lectures to relieve himself of the financial embarrassment. After 1890 he lived for ten years in Europe.

His writings are characterized by rich humor, dramatic insight and genuine hatred of snobbery and affectation. He had remarkable powers of observation, a first-hand knowledge of life and was on good terms with every type of man. His most permanent work is his picaresque novels. The public first accepted him as merely a humorist, but before his death came to recognize that he was fundamentally a profoundly serious man. He showed interest in social and political problems and at times struck depths of sincere pathos or revealed splendid courage and wholesome integrity. The favorite novels have been *Adventures of Tom Sawyer* and *Adventures of Huckleberry Finn*. Other works include *The Jumping Frog*, *The Prince and the Pauper*, *Innocents Abroad*, *Roughing It*, *The Gilded Age*, *A Tramp Abroad*, *Life on the Mississippi*, *A Yankee at the Court of King Arthur*, *Joan of Arc*, *Following the*

Equator, *Christian Science*, *Eve's Diary* and his *Autobiography*.

Clem'ent, the name of 14 popes, the first of whom is said to have been third from Peter in succession. This Clement was the author of several works, among which is an epistle to the Corinthians that, up to the fourth century, was used as a part of the Scriptures. Many writings once attributed to him have been found to have another origin. Clement II became pope in 1046 and occupied the papal chair but a year. He had been chancellor to Emperor Henry III, through whose influence other claimants were set aside. Clement III was pope from 1187 to 1191 and was the instigator of the Third Crusade.

Among the most important popes of this name are: Clement VIII, pope from 1592 to 1605, who was renowned for his piety, his keen, clear judgment and his encouragement of learning; and Clement XIV, pope from 1769 to 1774, whose statesmanship had wide political influence. This last pope of the name was a patron of learning and founded the Clementine Museum of the Vatican.

Cle'opa'tra, the regular name of queens of Egypt for several generations. The most famous is the Cleopatra who lived from 69 to 30 B. C. At 17 she became ruler of Egypt in conjunction with her younger brother. A few years later she was driven into Syria and was preparing to lead a force into Egypt when Julius Cæsar, who had followed Pompey to the East, fell in love with her and placed her back on the throne. She lived at Rome with Cæsar until his assassination. Later she became the mistress of Mark Antony (See MARK ANTONY). When Antony was defeated at Actium in 31 B. C., Cleopatra fled to Alexandria, where he followed her. She plotted with Octavius to assassinate Antony. Unaware of her plot, he committed suicide, thinking she had already done so in accordance with a compact that they should die together. When Cleopatra found that the cool Octavius was uninfluenced by her charms, according to tradition

after experimenting with various kinds of poison to find the easiest method of death, ended her life by placing an asp on her bosom.

Clepsydra. *Klep' sidra.* See CLOCK.

Cleve'land, Ohio, the county seat of Cuyahoga Co., the second port on the Great Lakes and the fifth city of the United States, is situated on Lake Erie at the mouth of the Cuyahoga River, on the N. Y. C., the Pennsylvania, the B. & O., the Erie, the Big 4, the Nickel Plate and the W. & L. E. railroads, 263 m. n.e. of Cincinnati, 183 m. w. of Buffalo, 357 m. by rail e. of Chicago and 623 m. from New York. Cleveland is beautifully situated on ground that rises gently from the lake until it reaches an altitude of about 115 ft. The city proper extends along the lake for over 14 m.; including its suburbs, it has an extent of 20 m. Its greatest extent inland from the lake is about 6 m. and the area about 45 sq. m. The city is divided into east and west parts by the Valley of the Cuyahoga River, which is deep and broad. In the valley are many of the manufactories, freight depots, railway yards and coal and ore docks. The valley is spanned by a number of bridges, one of which is a double deck structure, the largest of its kind in the U. S. The larger part of the city lies east of the river. The business center commences at the Public Square, from which streets radiate to all parts of the city and in which most of the street-car lines meet. The park is divided into four nearly equal parts by Superior Avenue and Ontario Street. Here are located the soldiers and sailors' monument and a statue of Gen. Moses Cleveland, the founder of the city, the Federal Building, the Chamber of Commerce Building, the Hotel Cleveland, and the site of the New Grand Union R. R. Station. The longest streets are approximately parallel to the lake shore and include Superior, Euclid and St. Clair avenues in the eastern division and Detroit and Lorain avenues in the western. One of the most distinctive features of the city is its broad streets, all of which were formerly so well shaded with

maples, elms and many other shade trees that Cleveland became widely known as the "Forest City." These beautiful trees have for the most part now disappeared from the business streets, but they are still conspicuous in the residence sections. Lower Superior Avenue and Euclid Avenue are the principal business streets.

PARKS AND BOULEVARDS. Cleveland maintains an excellent system of parks and boulevards. Rockefeller Park, comprising 273 acres, is the largest. It is a long, narrow parkway occupying the Valley of Doan Brook, and connecting Gordon Park on the lake front with Wade Park. It is also connected with a number of smaller parks and parkways. Gordon Park (112 acres) and Wade Park (85 acres) to the southeast are both noted for their gardens. In Wade Park are statues of Commodore Perry (See PERRY, OLIVER HAZARD), Goethe, Schiller and Kosciusko. The site of the new art museum is also in this park. Edgewater Park has good facilities for bathing and boating, as has also Gordon Park. Just outside the city limits are a number of parks patronized by people in their respective localities. Euclid Avenue is the principal thoroughfare of the city and was once, if it is not now, one of the most beautiful streets in the country. Some of the mansions formerly lining it still remain, but business structures are steadily encroaching throughout the length of the avenue. Other attractive boulevards are Clifton Boulevard, Lake Avenue and the Lake Shore Boulevard east of Gordon Park, upon which a number of beautiful estates have their entrances. There are over 42 m. of boulevards and parkways connecting the park system. Lakeview cemetery, occupying an eminence to the east of the city, is one of the most attractive burial places in the country. On the highest point is the Garfield Memorial, a combined monument, chapel and tomb erected at a cost of \$225,000. The structure is of Ohio sandstone. The top is bordered by reliefs depicting scenes in the life of the martyred president. The chapel is

adorned with symbolical panels and contains a marble statue of Garfield. His remains lie in a crypt under the chapel. John Hay and Marcus A. Hanna are also buried in this cemetery, and here is located Wade Memorial Chapel, erected at a cost of over \$350,000.

BUILDINGS. The business center has already been beautified by the erection of three of the public buildings which are comprised in the "group plan." These are the post office and the county courthouse and the city hall. The buildings will all be of granite and connected by a mall 600 ft. wide and extending from Superior Avenue to the lake. The entire plan will cost about \$20,000,000. Among the most important office and bank buildings are the Society for Savings, the Brotherhood of Locomotive Engineers Building, the Chamber of Commerce, the Central Armory, the "Old Arcade," the Rose, Rockefeller, Citizens, Guardian, Garfield, Leader, News, Cleveland, Hanna, Viscount, and the Keddy Theater and office buildings. The leading theaters include the Colonial, Keith's Hippodrome, Hanna, Ohio, Cleveland and the Euclid Avenue Opera House, and many beautiful picture houses. Among the leading hotels are the new Statler with 1,000 rooms, the Hollenden, the Colonial, the Cleveland, the Winton, the Euclid, and the Gillsy. The most prominent church edifices are the Roman Catholic Cathedral, Trinity Cathedral (Protestant Episcopal), First Methodist Episcopal, Euclid Avenue Baptist, First Presbyterian (the Old Stone Church), St. Paul's Episcopal and Plymouth and Pilgrim Congregational.

INSTITUTIONS. Chief among the educational institutions is Western Reserve University, with its law, medical, dental, library and pharmaceutical schools and Adelbert College and College for Women; and the Case School of Applied Science, a technical college ranking high among such institutions. Other schools of importance include St. Ignatius College and St. Mary's Theological Seminary, both under the auspices of the Catholic Church; the Cleveland Homeo-

pathic College and the Cleveland Art School. There is also a school for the deaf, dumb and blind. The public schools are of a very high order and are managed on a plan that has received high tribute from leading educators.

The chief social settlements are the Goodrich House, the Hiram House and the Alta House, all among the best equipped and most efficient in the country. A farm of 1600 acres, known as the Cleveland Farm Colony, is maintained 11 m. from the city. The farm is divided into a "Correction Group" which takes the place of workhouses, and an Infirmary and a Tuberculosis Sanatorium. Those formerly classed as paupers are given labor on this farm, where they are housed in cottages. But perhaps the most unique institution connected with the city administration is the Boys' Farm, 22 m. from the city, to which the Juvenile Court sends so-called incorrigible boys. The community exerts a powerful influence for good. There are numerous hospitals, homes for children and for the aged, all of which are organized on a cooperative plan by the associated charities.

INDUSTRY AND COMMERCE. Cleveland is the most convenient meeting place for the iron ore of the Lake Superior region and the coal and petroleum from the coal and oil fields of Ohio and Pennsylvania. It has consequently become the greatest ore market in the world. It also leads all other cities in the world in the manufacture of nuts, bolts, wire nails and steel wire and many other products, including among its manufactures a very great diversity of articles, not only of metals but of textiles, wood and paper. The city has a very large output of sewing machines, printing presses, electric carbons and dry batteries and other electrical supplies, automobiles, steel bridges, automobile, carriage and saddlery hardware, castings of iron, steel, brass and aluminum, women's wearing apparel, incandescent electric lamps, hoisting and conveying machinery, paints, oils and varnishes, knit goods, chewing gum and confectionery, machine and hand tools,

heavy machinery, metal stampings, gas, oil and coal stoves, worsted cloth, telescopes, tacks, paper boxes, pig-iron and steel and manufactured products valued at over one billion dollars annually. There are large printing and publishing plants.

The outer harbor is enclosed by a government breakwater nearly five miles in length, through which there is an entrance 700 ft. wide opposite the mouth of the Cuyahoga River. The inner harbor comprises the lower part of the Cuyahoga River. The channel on the east side of the river mouth is lined by docks and on the west side by a concrete jetty, over 1000 ft. long. For over four miles the channel has been dredged to the depth of 21 ft. The docks are fitted with the most modern machinery for handling freight, and the great ore docks are among the most interesting sights of the city. The principal fleets of the Great Lakes in the ore- and coal-carrying trade and one of the principal lines of passenger and packet steamers make their headquarters here, and the city is likewise one of the important railroad centers in the country.

GOVERNMENT. Cleveland is one of the best-governed cities in the United States, a condition due largely to the interest which the citizens in general take in local affairs. There is a city council of 32 members, which is presided over by the vice-mayor (who has the deciding vote). The mayor is the chief executive and he appoints a director of public service and a director of public safety. The school council of seven members, city solicitor, city auditor and city treasurer are elected by the people. The efficiency of Cleveland's government is due largely to two prominent organizations, the Chamber of Commerce and the Municipal Association. The Chamber of Commerce has not only promoted the business interests of the city but has looked after its civic welfare as well. The Municipal Association reports on the qualifications of candidates for public office, and the conduct of their offices, and performs other services along these lines. The Chamber of Commerce has been especially influential

in securing the construction of the new public buildings on the group plan, described above; in preventing overcrowding tenement districts, by securing the passage of an excellent tenement law; in securing improved conditions for workmen in factories; in promoting municipal sanitation; supervising charitable organizations and in many other constructive efforts. The Home Gardening Association has done much to beautify the city through the distribution of seeds to school children and encouraging them to plant and care for the same. This association is one of the most successful organizations of its kind in America.

HISTORY. Cleveland lies in the territory originally claimed by Connecticut and known as the Western Reserve (See WESTERN RESERVE). This land was purchased by the Connecticut Land Company, and in 1796 Gen. Moses Cleveland, the agent for the company, established a settlement at the mouth of Cuyahoga River. In 1810 it was made the county seat of Cuyahoga County, and in 1814 it was incorporated as a village. In 1827 the Ohio Canal was opened to Akron and in 1832 it was completed to the Ohio River. This added to the importance of Cleveland as a lake port, and at about this time the harbor was improved. Between 1850 and 1860 numerous important railway connections were made, and during the Civil War the manufacturing interests developed rapidly, many factories supplying material for the United States Government. In 1854 Ohio City west of the river was annexed. Since then a number of annexations of adjoining villages have taken place. In 1896 the city celebrated the hundredth anniversary of its settlement. The history of Cleveland has been one of continuous prosperity and progress. Population in 1920, 796,841. Consult Thwing's *Cleveland, the Pleasant City*.

Cleveland, (Stephen) Grover (1837-1908), an American statesman, twenty-second and twenty-fourth president of the United States, born in Caldwell, N. J. His father was a Presbyterian clergyman, who died when Grover was 16 years old.

This forced the son to earn his own living, and he became tutor and accountant in an institution for the blind in New York City. In 1855 he went as far west as Buffalo, where he assisted an uncle and studied law, being admitted to the bar in 1859. He soon became known as an able and fearless lawyer. In 1863 he was appointed assistant district attorney of Erie County, became sheriff in 1870 and was elected mayor of Buffalo in 1881 on the Democratic ticket, overcoming a naturally large Republican majority. He made a reputation by his able and independent administration of that office, and in 1882 was elected governor of New York by the unprecedented majority of 193,000.

As governor he was an indefatigable worker and administered the affairs of the state with such efficiency that he was nominated for the presidency of the United States in 1884. He was elected over James G. Blaine, the Republican nominee, being the first Democratic president since Buchanan. During his term of office Cleveland made unusual use of the veto power, especially in connection with private pension bills.

He was nominated by his party by acclamation in 1888 for a second term, but was defeated, largely on the tariff issue, by Benjamin Harrison, the Republican nominee. This action was reversed, however, in 1892, when Cleveland was elected over Harrison by a very large majority. His second term of office witnessed the severe financial panic of 1893, the enactment of the Wilson tariff law and the vigorous enforcement of the Monroe Doctrine in connection with England's controversy with Venezuela.

After his second administration Cleveland retired to private life, but remained the real leader of the conservative or "Gold Democrat" wing of his party until the time of his death. He was much in demand as a contributor to periodicals on public questions and as a public speaker. With the passing years Cleveland's reputation as a man of marked ability, honesty and courage has greatly increased.

Click Beetle, or Skipjack, a family of

curious little beetles, recognized by the long, narrow body and the backward-projecting, horny extension upon the first segment of the thorax. Most click beetles are brown, gray or black, but some have bright bands, and a few Southern species are luminous. The name is derived from the creature's habit, when laid upon its back, of springing into the air with a clicking noise. The springing apparatus is a small cavity upon the underside of the body into which the horny projection extends. By a bend of the body, the beetle brings the tip of this to the edge of the cavity and then quickly releases the muscular tension. The result is the lifting of its body into the air and so righting it. If disturbed, the click beetle feigns death until the danger is past. The luminous parts of the Southern beetle are the under part of the abdomen and two large round spots upon the back near the head. Cuban ladies use members of this species as ornaments. The larva of the click beetle, which is a soft, white maggot living in decaying wood, and known as the wireworm, is very destructive. See INSECTICIDE.

Client, Kli' ent, in law, one who consults an attorney or who employs an attorney to prosecute or defend a suit at law. The term originated in Rome from the custom practiced by citizens of a lower rank of choosing someone from the higher classes to whom they could go for advice and counsel, especially in legal matters.

Cliff Dwellers, the supposed ancestors of the Pueblo Indians. This aboriginal American race built houses on the cliffs bordering the canyons of the Rio Grande and the Colorado rivers. There are many ruins of their dwellings in the San Juan Valley, and archaeologists find the rude carvings, excavated ornaments and tools interesting material for study and research. Many dwellings were built as high as 300 ft. up the side of a cliff. One of the strongholds contained about 127 rooms and housed comfortably over 1000 persons.

The cliff dwellers were an agricultural people, cultivating tobacco, cotton,

beans and maize. They domesticated the turkey and the llama, and used copper for ornaments; otherwise the use of metals was unknown. Weapons were made of bone and flint. The people were familiar with the art of weaving, and their pottery was tastefully decorated.

Those who have explored these canyons have excavated an interesting mass of material, such as spearheads, stone axes, bone needles, fibred cords and sandals. Many of the walls are covered with hieroglyphics. Means of access to these dwellings high in the sides of the steep cliffs was afforded by log ladders, ropes and rude rock steps. Various speculations in regard to the antiquity of this race have been indulged in, but from the discoveries that have been made, there is nothing to indicate that they are a distinctly primitive race. The United States Government is restoring some of the most interesting of the ruins.

Climate, the average succession of weather conditions, including temperature and rainfall of a place or region. Weather is only a phase of climate extending over a limited period of time. Thus we say that July weather is hot or dry, but that the climate of England is mild, meaning in the latter connection that the mean weather condition (for all months, seasons and years) is characterized by mildness. The chief climatic elements are temperature, moisture and wind. The first of these is governed principally by latitude. In general, the farther away from the equator a given locality the lower will be its average temperature. Solar heat divides the earth's surface into five principal climatic zones: the torrid zone, extending from the tropic to the tropic; the two temperate zones, extending from the tropics to the polar circles; and the two frigid zones, lying about the poles. The conditions which severally characterize these zones are not limited, however, by latitudinal parallels, as other factors besides the relative position of the sun determine the climate of a place.

Climates are classified as continental and oceanic. Land, or continental, cli-

mate is characterized by greater extremes of temperature than the oceanic and by a deficiency of moisture; water, or oceanic, climate is marked by a small daily and annual range of temperature for a given area and by an excess of moisture. There are several reasons for this difference, and this brings us back to the determining climatic factors other than latitude. On land the chief causes of variation are altitude, positions of mountains and oceanic exposure. So marked is the effect of altitude upon climate that tropical mountains, if they are of sufficient elevation, will exhibit upon their slopes successive belts of vegetation corresponding to the several solar zones, and plateaus occurring in intolerably hot regions may have delightfully cool climates. Whereas elevations in general affect chiefly the temperature of their areas, the position of a greatly elevated portion of a continent has a marked influence upon its rainfall. The rain-bearing winds of tropical latitudes, which usually blow from the east, are divested of their moisture when intercepted by high mountain ranges; consequently on the western slopes of such mountains desert conditions may prevail, while the eastern slopes may be clothed with luxuriant vegetation. The Peruvian Andes present this contrast, the eastern side being subject to frequent and heavy rainfall, while the western slopes are dry and barren. At the extreme southern end of these mountains, where the prevailing winds come from the opposite direction, the conditions are reversed.

Deserts present an extreme type of continental climate. Here the daily range of temperature is greatest, the nights not infrequently dropping to a temperature of 40° , and the days rising to 120° . The influence of vegetation upon the climate of surrounding regions is very marked. Trees increase the amount of water vapor in the air with the moisture they breathe out, thus giving rise to continual evaporation; other growths cut off the wind and so decrease evaporation of surface moisture. Proximity to the ocean also determines the

climate of a locality to a certain extent as to both temperature and moisture. The climates of coastal regions is not only milder, but also more equable than that of inland areas. This is due largely to the fact that great bodies of water do not change their temperatures suddenly and, therefore, do not alter suddenly the temperature of the overlying atmosphere. The daily range of temperature of oceanic climates is only 2° or 3° between latitudes zero and 40° . By virtue of the elastic property of water, the waters at the equator and those at the poles are being continually mixed, so that the surface waters present, comparatively, slight variations as to temperature. The effect of ocean currents upon climate is well known. The warmth of western Europe and also of the British Isles is due to the Gulf Stream. Winds are instrumental in affecting both continental and oceanic climates by giving rise to evaporation, distributing moisture and by equalizing temperature by atmospheric circulation, thus preventing excess of heat or cold in certain areas.

If a climate shows a small range of temperature, equal distribution of rain or snow and constant winds, it is said to be uniform. If, on the contrary, the variations of these climatic elements are great, the climate is called variable. The United States possesses a highly variable climate, due to its latitudinal extent, its ocean boundaries, its lofty mountains and the several determining factors already mentioned. See RAIN; WIND; OCEAN.

Clin'ton, De Witt (1769-1828), an American statesman, promoter of the Erie Canal, born at Little Britain, N. Y. He graduated at Columbia College in 1786, studied law and was admitted to the bar in 1788, but gave his attention chiefly to politics. He was a member of the State Legislature from 1797 to 1802, when he was chosen to the United States Senate. He soon resigned, however, to become mayor of New York, which position he held until 1815 except for two brief intervals. During this time he was also state senator from 1803 to 1811, and lieutenant-governor from 1811 to 1813.

He was defeated by Madison for the presidency in 1812. In 1817 he was elected governor of New York and was reelected three times.

Clinton helped to give the city of New York its metropolitan character by his efforts in founding and encouraging institutions of science, literature and art, and the passage of sanitary laws; but his great monument is the Erie Canal, to which he devoted the best years of his life, and which he had the honor of opening with great ceremony in 1825 when he was carried on a barge in a triumphal progress from Buffalo to New York. See ERIE CANAL.

Clinton, George (1739-1812), an American soldier and statesman, born in New York State. He served in the French and Indian War, after which he studied law and settled in his native town. In 1768 he was elected to the State Legislature, where he resolutely maintained the cause of the colonies, and was elected to the Second Continental Congress in 1775. He was appointed a brigadier-general in the Continental army in 1777. In the same year he was elected the first governor of New York and served until 1795 with great efficiency, encouraging education and the internal development of the state, and exercising notable influence over the Indian tribes in his dealings with them. In 1788 he presided at the state convention called to consider the Federal Constitution, the ratification of which he opposed because of its centralization of power. He became governor again in 1801, and in 1804 was elected vice-president of the United States, which office he held until his death.

Clinton, Sir Henry (about 1738-1795), a British general in the American Revolution, son of Admiral George Clinton. In 1758 he became captain and lieutenant-colonel in the Grenadier Guards. He distinguished himself during the Seven Years' War as aid-de-camp to Ferdinand of Brunswick, and by 1772 had become a major-general. Three years later he arrived in Boston. He served at Bunker Hill and was second in command of the actions preced-

ing the American evacuation of New York, September, 1776, taking that city after Washington's defeat at Long Island. For this he was commissioned lieutenant-general and knighted, succeeding Howe as commander-in-chief in 1778. After his evacuation of Philadelphia Clinton fought with Washington at Monmouth. In December, 1779, he went to South Carolina, where on May 12, 1780, he captured Charleston and Lincoln's force of about 6000. In October, 1781, he sailed for Chesapeake Bay with a strong force to aid Cornwallis. At the entrance of the bay, however, he heard that the British had surrendered on the same day that he had left New York. He was replaced by Carleton in 1782 and returned to England, and again entered Parliament, in 1790. Three years later he became governor of Gibraltar.

Clinton, Iowa, a city and county seat of Clinton Co., 60 m. s.e. of Dubuque and 128 m. w. of Chicago, on the Mississippi River and on the Chicago & North Western, the Chicago, Milwaukee & St. Paul, the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific and other railroads. There is an excellent street-railway system, and interurban lines connect with Davenport and other near-by towns and cities. Clinton is situated in the fertile Mississippi Valley and has extensive manufacturing. The river is here spanned by a railroad and several wagon bridges which connect Clinton with Fulton and East Clinton (Ill.).

PARKS AND BOULEVARDS. The main portion of the city lies between the river and a series of bluffs and is attractively situated. The streets are broad, well paved and shaded and there are many beautiful residences and suburban homes.

PUBLIC BUILDINGS. Among the most noteworthy structures are the city hall, courthouse, Federal Building, several banks, many churches, a high school, and substantial business houses.

INSTITUTIONS. The educational institutions include Mount St. Claire Academy, Our Lady of Angels' Seminary, a

high school, a Junior H. S., elementary parochial and parish schools, a business college and a public library. Clinton is the seat of Wartburg College (German Lutheran), founded in 1894.

INDUSTRIES. The city is the trade center for a large region and has stockyards and numerous extensive sawmills, bridge works, paper mills, foundries and machine shops, locomotive-repair shops, packing houses, carriage and wagon factories, sash, blind and door factories, pressed-brick works and manufacturing of boilers, wire cloth, papier-mâché goods, boats, automobiles, saddlery and harness, door locks and glucose products. A large sugar refinery is located here.

HOME LIFE. The people of Clinton have striven with success to make Clinton as nearly ideal as possible in relation to living conditions. The result of this has been that it is considered one of the best labor markets in the country. One of the best things that has recently been accomplished is the organization of the Agricultural Committee of the Clinton Commercial Club, which has worked out a plan to unite city and country as a unit and to develop the agricultural interests of the surrounding country. An agricultural adviser has been employed for a term of three years.

HISTORY. Clinton was founded in 1855 by the Iowa Land Company and named in honor of DeWitt Clinton. The town was incorporated in 1857 and reincorporated in 1867 under the state law for the incorporation of cities. The city of Lyons, with a population of about 6000, was annexed to Clinton in 1895. Population in 1920, U. S. Census, 24,151.

Clinton, Mass., a town of Worcester Co., 40 m. w. of Boston, and 12 m. n.e. of Worcester, on the Nashua River and on the New York, New Haven & Hartford and the Boston & Maine railroads. The Wachusett reservoir, which supplies water to Boston, is situated here. Clinton has extensive manufacturing of carpets, ginghams, machinery, woolen goods, wire cloth, worsteds and yarns. It was incorporated as

CLINTONIA

a town in 1850. Population in 1920, U. S. Census, 12,979.

Clinto'nia, a woodland plant of the Lily Family growing in great profusion in the Northern States. It has three broad, light green leaves growing directly from the bulb, and from clasping stems of these arises a slender, leafless flower stalk with three or four nodding, yellow flowers. The petals are recurved, and slightly greenish without, and they hang like fairy bells, shaken by the wind.

The leaves and flowers are much like those of the adder's tongue, or so-called dog-tooth violet, but a little observation



CLINTONIA

makes their distinguishing marks plain. The adder's tongue has but two leaves, which are a little less broad and are more or less brown-spotted; its leafless stem has but a single flower, which blooms in May or early June, while that of the clintonia appears a little later.

The Clintonia was named for Gov. De Witt Clinton of New York, and, strangely enough for such a widely-known and loved flower, has no common name. The full name of the most common species is *clintonia borealis*. The fruit, which is a dark, unusual blue having no purple tinge, ripens in August.

Clio, *Kli' o*, Muse of history, was a daughter of Jupiter by Mnemosyne. She wore a laurel wreath and carried a trumpet and papyrus roll. Clio was one of nine Muses and was first called Muse of epic poetry.

Clive, Robert, BARON OF PLASSEY (1725-1774), an English general, the founder of British supremacy in India.

CLOCK

He was born near Market Drayton, England. When 18 years of age he went to India as a clerk of the East India Company. In 1747, on the outbreak of war in India between England and France, he joined the English army. His success in the capture of Arcot led to further commissions and gained for him



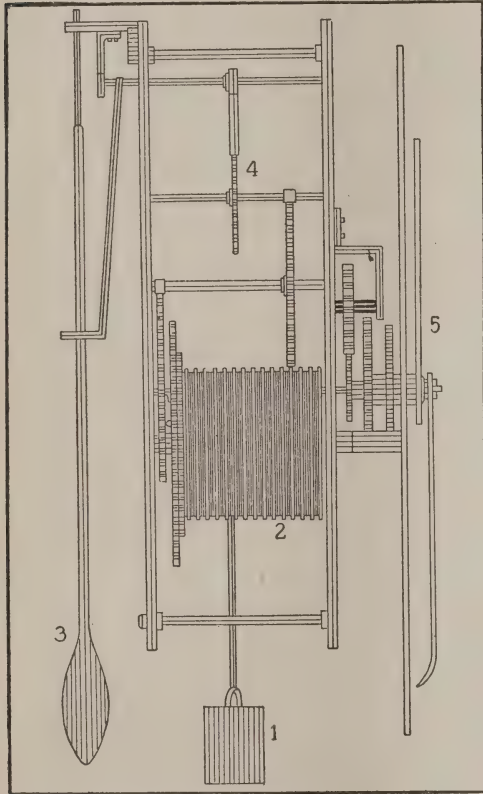
CLIO

a very favorable reputation. He went to England in 1753 where he was enthusiastically received, and in 1755 was made lieutenant-colonel and returned to India. In 1757 Clive won the decisive Battle of Plassey which gave India into the control of Great Britain. After visiting England in 1760, where he was greatly honored, he returned to arrange certain difficulties that had arisen in the affairs of the East India Company. He succeeded in his task, but on his return to England was accused of having made use of his appointment for personal gain. He was fully exonerated, but felt the disgrace so keenly that he took his own life.

Clock, a device for measuring time and indicating the hours, minutes and seconds by means of hands moving over the graduated dial plate. In addition to the dial and hands, the essential parts of a clock are the weight, or spring, to furnish the power, a system of wheelwork to

impart motion to the hands, and a pendulum and escapement to regulate the motion of the wheels. Since the motion of the pendulum is uniform, it is only necessary to keep it constantly swinging to have it measure time accurately, and this constant motion is secured by the weight or spring, as the case may be, acting on the escapement.

In the cut, 1 is the weight; 2, the cylinder upon which the cord is wound; 3, the



MECHANISM OF A CLOCK

pendulum; 4, the escapement; 5, the train of wheels which impart motion to the hour and minute hands respectively.

At each stroke of the pendulum one of the teeth of the escapement is unlocked and the wheel allowed to turn to the next tooth. At the next stroke of the pendulum, another tooth is unlocked, and so on. In the ordinary clock the wheels are so geared that the hour hand makes

two revolutions in 24 hours, and the minute hand moves 12 times as fast as the hour hand. Thus in five minutes, the minute hand covers the space covered by the hour hand in 60 minutes. The length of the pendulum is regulated by sliding the weight, or bob, up and down on a bar (See PENDULUM). A clock made on this principle keeps good time, and those operated by weights were used in Holland and in colonial times in the United States for many years. A sidereal clock is used by the astronomers and is constructed so that the hour hand rotates at the rate at which the fixed stars appear to revolve about the earth, making a revolution in 24 hours. The chronometer is a spring clock in which a wheel oscillates instead of a pendulum, and is held by a fine hairspring so that its vibrations are regular; in fact, it is a large watch (See WATCH) and is used on ships in calculating longitude in connection with a sextant (See SEXTANT).

We do not know when or by whom the clock was invented. The first clock of which we have any record dates from 1379. Before the invention of the clock a number of crude devices for measuring time were in general use, the most common being the sundial, hourglass and clepsydra, or water clock, a contrivance for measuring time by the graduated flow of a liquid through a small aperture. The wheels and pinions of the older clocks were made of wood and by hand labor, but now the works are made of brass and steel, and all the work except putting the clocks together is done by machinery. The United States leads in the manufacture of clocks and the largest clockworks in the world are at Waterbury, Conn. Apparatus for enabling the clock to strike the hours and half hours, alarms and other devices have been added to the original clock, which was only a timekeeper. While these additions are a convenience, they are not essential. Some of the great clocks in the cathedrals of Europe are wonderful pieces of mechanism. See STRASSBURG CLOCK.

Cloquet, *Klo ka'*, Minn., a city of Carlton Co., 29 m. s.w. of Duluth, on

the Great Northern, the Northern Pacific and the Duluth and North Eastern railroads. The town is a lumber center of considerable importance, with a large output of white pine. Good water power is derived from the St. Louis River and used in manufacturing, and electrical power is supplied to other cities. The principal industrial establishments are lumber mills, box factories, paper mills and manufactories of wood pulp, ties and wall paper board. The name of the village is derived from the French word *claquet*, meaning sound of mill. The place was incorporated in 1879 and chartered as a city first in 1883 and again in 1903. Population in 1920, 5,127.

Clothes Moth, a family of insignificant but harmful moths which feed upon stored woolen goods and are the despair of housewives. There are several genera, but the habits of all are similar. The female deposits her eggs in woolen garments, and there they hatch into voracious larvæ which feed upon the cloth, make themselves cocoons or webs of it and do great damage thereby. After a short rest in the cocoon, the adult emerges as a small gray or brownish moth. There are commonly two or three broods in one season.

Moths will not live in a temperature below 40° F.; hence the value of cold storage for woolens and furs. Sunlight is also hateful to them and frequent airing of the stored goods prevents the growth of the pest. Storerooms and chests may be fumigated with carbon bisulphide, whose fumes are certain death to both moths and larvæ, or they may be sprinkled with benzene or naphtha if care is used, since both of these latter are highly explosive if brought near fire. See INSECTICIDE.

Cloud, a mass of minute drops of water floating in the atmosphere. The only difference between clouds and fog is, that fog rests upon the surface of the earth, while clouds are always some distance above the earth. Both are results of the same cause, the condensation of water vapor in the atmosphere. Since cold air cannot contain as much water

vapor as warm air, whenever the temperature of the atmosphere is lowered a portion of the vapor is condensed and forms fog or clouds, as the case may be. Since the atmosphere at all times contains a countless number of minute particles of dust, the moisture gathers upon them. These dust particles also cool more quickly than the air and thereby hasten the process of condensation. A warm current coming in contact with a mass of cold air has a part of its vapor quickly condensed, as when a warm wind strikes the cold air lying over a large body of water. In this way a fog is formed, which usually rises and becomes a cloud. For a similar reason the summits of high mountains are often shrouded in mist. Again, upward currents of air produce clouds. There are two causes for the cooling of upward currents. First, the upper layers of atmosphere are cooler than those near the earth and cause the temperature of the ascending current to fall. Secondly, the upper layers of atmosphere are less dense than those near the earth. This causes the air in the ascending current to expand and the expansion lowers the temperature. The large fleecy clouds so common on hot summer days are usually caused by ascending currents.

FORMS OF CLOUDS. As we look into the sky we always notice the different forms of clouds, and a little attention reveals the fact that the same form always occupies relatively the same position. Clouds are of three principal forms—the cirrus, the cumulus and the nimbus. Modifications of each of these forms are given various names.

Cirrus. Cirrus clouds are those having the appearance of curls of snow-white hair, and form at high altitudes usually from 20,000 to 30,000 ft. From their altitude we know that they are formed of spicules of ice. Cirrus clouds sometimes form long parallel bands, which extend nearly across the sky. This form of cloud is called *cirro-stratus*. Occasionally cirrus clouds have a light feathery appearance, forming what is commonly known as a "mackerel sky."

CLOUDBURST

Cumulus. The cumulus is the large fleecy cloud common in summer and rolling up in huge dome-shaped masses. They frequently condense into a rain cloud and cause local thunderstorms. A combination of this cloud with the cirrus forms the *cirro-cumulus*. The cumulus occasionally assumes a more flattened form and nearly overspreads the sky. In this form it is known as the *strato-cumulus*.

Nimbus. The nimbus is the dark, heavy rain cloud that overspreads the entire sky. Movements are usually occurring within it, and it often combines with the cumulus, forming the *cumulo-nimbus*.

HEIGHT OF CLOUDS. The height of clouds varies from possibly ten miles in the highest cirrus to 1600 to 1700 ft. in the lowest stratus. Next to the stratus is the nimbus, which has a mean altitude of about 2200 ft. Above the nimbus are the various forms of cumulus, which vary from two and one-half to five miles.

Cloudburst, a sudden downpour of rain or of rain and hail. It sometimes happens that moisture is carried up and sustained by strong ascending currents of air until an excessive amount has accumulated. When finally the air current is weakened or broken up, a great downpour occurs. The phenomenon frequently occurs in connection with tornadoes, the velocity of the ascending currents providing a force sufficient to collect and uphold great volumes of water. Cloudbursts are not uncommon in mountainous regions, where the high peaks hasten condensation by cooling rapidly the warm, moist currents that ascend their slopes. In these regions the torrents of water cut deep gulches, or, rushing over the rocky surfaces, carry quantities of loose soil and other material down into the valleys below.

Clove, a small evergreen tree of the Myrtle Family, which produces the spice of the same name, widely known and used in cookery. The tree is a native of the Moluccas, but because of the wide use of the spice, its cultivation has be-

CLOVER

come an important industry of tropical countries. The clove tree rarely exceeds 20 ft. in height, and has round, reddish-brown branches thickly set with pointed, brown-green leaves which stand quite erect along the stem. The flowers' calyx cups are red in color, with long, slender tubes which have five or six small, pointed lobes at the summit. The petals are yellowish-white and when ripening form a plump ball at the top of the calyx. Within this ball are the many stamens. These calyxes with the unopened petals form the familiar clove of commerce.

Cloves are set out as seedlings and carefully tended until they are five years old, after which they begin to bear. Clove harvest begins in the early autumn and the trees are picked over three times during each season. In picking, both buds and stalks are taken, but later the stalks are clipped away and only the buds dried. The stems are used in the production of oil of cloves, a counter-irritant used medicinally.

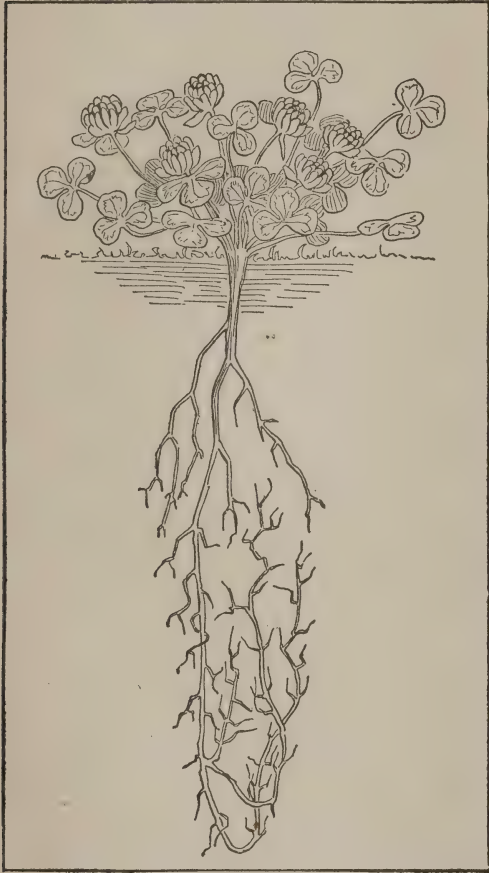
Clo'ver, an exceedingly common plant of the Pulse, or Pea, Family, either growing as a weed or cultivated for fodder and bedding for cattle. There are over 300 species known and the majority of these grow in the United States, though probably the most important were introduced from Europe. Certain characteristics are common to all: their leaves, made of three oval leaflets meeting at the top of the stem; their downy, slender stems; and their rounding heads of tubular red, pink or white flowers.

Probably the most important clover is the common red clover, a forage plant, extensively cultivated because of its great nutritive value to stock. Its stems are slender but in general direction are ascending. The leaflets are notched at the end and marked near their bases with a gray-white inverted V; often the leaves are extremely large as compared with those of the lawn clover. The blossoms are in large globular heads, sweetly scented and stored with honey. This blossom is the state flower of Vermont. Red clover is a perennial, that is, it grows from the same root year after year

CLOVER

without resowing, and is the species that requires the services of the bumblebee to fertilize it. See BEE.

Swedish clover, or alsike, is a favorite Western clover, since it grows well under irrigation. The white lawn clover, which produces pink-tinted heads of blossoms, has small, blue-green leaves on very short stems and grows well on gravelly soils where grass does not thrive. Its growth is not retarded by continued



CLOVER

mowing nor does it seem harmed by constant trampling, so it is commonly sown on playgrounds, meadows or unsuccessful lawns. This clover is valueless as fodder. Dutch clover is a white-flowered clover sown as a grazing plant for sheep. The other useful clovers are all very similar to these above described. As

CLOVIS

weeds, many grow along the roadside and are erect and tall, with drooping, white blossoms, as the tree clover and sweet clover; or are low and insignificant and have yellow blossoms as the hop clover.

The value of clover as a farm product is enhanced by the fact that its long roots take great quantities of nitrogen from the soil and store it in the leaves and stems. A ton of red clover green contains 270 lb. of nitrogen extract. On this account farmers often sow clover and plough it under to enrich worn-out fields. Experiment has shown, too, that the roots are filled with bacteria which are capable of drawing nitrogen from the upper soil and depositing it in the lower. Thus clover is a good alternate crop, for it leaves the soil richer in nourishment than it found it. It is often sown in orchards for a like reason.

The clover blossoms, rich in nectar, are eagerly sought by the bees which hover constantly over the fields in the sunny, summer days. The honey, made from these blossoms, is light-colored, mild and pleasant to the taste. The sweets, stored in the cells of the blossoms, however, are merely the just wages of the bee who gives his services in cross-fertilizing the flowers. See CROSS-FERTILIZATION.

Europe, the United States and Canada probably raise the most clover, but lately it has been introduced into South America and South Africa in the south temperate zone.

The name clover is derived from the Latin word for *club*, probably because the leaf called to mind the three-pronged club of Hercules; a conventionalized representation is retained in the clubs of playing cards. See SHAMROCK.

Clo'vis (about 465-511), King of the Franks. In 481 he succeeded to the throne of the Salian Franks, and his first notable achievement occurred in 486, when he overthrew the Gallo-Romans, near Soissons, and occupied the country between the Somme and the Loire. In 493 he married Clotilda, a Christian princess. In a great battle with the Alem-

anni, near Cologne, Clovis was hard pressed, and in desperation offered to become a Christian, if the God of Clotilda obtained for him a victory. He won, and on Christmas Day, with several thousand of his army, was christened by the Bishop of Rheims. In 507, inspired by love of conquest as much as by religious zeal, he marched against the visigoths of southwestern Gaul, whom he subjugated. His remaining years were spent in Paris. The great aim of Clovis' life was to form the entire Frankish people into a single powerful kingdom. However, the plan was frustrated at his death by the division of the kingdom among his four sons.

Club Moss, or **Ground Pine**, a widely distributed class of plants of the Club Moss Family, which, instead of reproducing by seed, bear tiny bodies called spores, capable of generating new individuals. There are many species of club

moss, the most common of which is found creeping along the ground of damp woods or rocky hillsides. The stem is soft, cylindrical in form and closely set with tiny, pointed leaves. These stems send out roots from the underside, and from the upper, erect, leafy branches, which bear what might be



CLUB MOSS

termed flower heads but which are really a thick cluster of spore-bearing leaves. The spores lie in a little spore case at the base of the leaves, and when ripe the case splits, discharging them in a fine dust. The leaves which have the spore cases are broader than the sterile leaves and in this respect seem to simulate petals. The club mosses are practically evergreen, and in the autumn or winter,

by pushing away fallen leaves or snow, the green, branching stems may be found trailing over the ground as bright green in color as the earliest spring leaves. Their pliable stems and fresh color make them effective winter decorations and they are often used in place of holly, for when gathered and kept in a damp place they retain their color and freshness for many months. Other club mosses have tougher underground stems and less soft foliage.

Clytie, *Klish' i e*, or *Kli' te*, a water nymph who loved Apollo. As he scorned her passion, she refused food, and crouching on the ground, pined while she watched his progress, as sun, through the heavens. After nine days her limbs had taken root and her face became a sunflower, turning, ever constant, toward her love.

Coach, a closed, four-wheeled carriage, first known early in the 15th century. Coaches were introduced into England about 1550, but for a long time were used only by people of considerable means. In 1625 London hotels kept a total of 20 coaches for the convenience of guests and others. Perhaps a decade later, coaches for hire became available at regular stands. Stage coaches also came into use in London early in the 17th century. At its close, they were running regularly on three of the principal roads of England. They were not kept in operation during the winter months; and even in the summer the condition of the roads was so bad, and the delays caused by floods so frequent, that they could average only three or four miles an hour. Mail coaches were introduced somewhat later. In early colonial times in the United States, coaches were kept only by a few of the well to do. The stage coach has been used during the period of pioneer life in every part of America; and the famous Concord coaches hold a prominent place in our history. The body of these coaches was supported by straps, as springs had not then been adapted to such use. Naturally, they had a peculiar lurching motion very wearisome on a

long journey, especially if the roads were rough. The modern tallyho is a huge coach used at fashionable resorts and in large cities.

Coal, a solid mineral fuel found in the ground. It has no definite chemical composition, its principal content, carbon, varying from 90 per cent to less than 40 per cent. Hydrogen, oxygen and nitrogen are also present in variable amounts.

ORIGIN AND FORMATION. Coal is generally found in veins or seams separated by layers of other materials which frequently consist of clay, shale, grit or sandstone. From impressions on this rock and from fossils lying adjacent have been ascertained the kind of vegetation which has produced coal, and the character and method of its formation. During the coal-forming epoch, large swamp areas were covered with a growth of rank and luxuriant vegetation, which, though dying at the bottom, kept growing at the top. An accumulation of vegetable matter was formed as the plants died, the weight above causing the remains to be compressed into a thick layer which sank below the surface of the swamp and became gradually covered by sand, mud and water. The vegetable mass, after a long period under water, was again elevated, the sand became rock, and on the soil which accumulated on its surface, a second growth of vegetation flourished. This in time was also submerged, and the pressure and heat attending these successive upheavals and depressions changed the vegetable mass into coal. Thus, as the land alternately sank and rose through thousands of years, were formed these alternating beds of coal, shale and sandstone common to all coal fields.

VARIETIES. There are a number of varieties of coal, due chiefly to the time of its formation and to changes which it has undergone since it was formed. The chief varieties are anthracite, and bituminous, semibituminous, cannel and brown coal (lignite).

Anthracite. This generally contains 85 per cent or more of fixed carbon, with but little ash, sulphur or moisture, and is

the hardest and best coal, possessing great heating power and burning with a smokeless flame. Anthracite is very hard and dense and has a shiny luster. Its production in the United States is confined chiefly to the eastern edge of the Appalachian Mountains in Pennsylvania, where the coal seams have been greatly compressed by the folding of the rocks. In Colorado near Crested Butte, it is known that the bituminous coals have been transformed into anthracite by geologic changes. England and China mine large quantities of anthracite.

Bituminous Coal. This is often known as soft coal. It contains from 50 to 75 per cent of fixed carbon and from 25 to 30 per cent of volatile matter, probably hydrocarbons, that is, compounds of hydrogen and carbon. These cause bituminous coal to burn with a bright flame, and when first ignited, with dense black smoke. This is an excellent coal for use in boilers in producing steam and it is in very general use for this purpose. It is also the coal from which coke is made. See COKE.

Bituminous coal is widely distributed. It occurs in the western ranges of the Appalachian Mountains in Pennsylvania, West Virginia, Tennessee and Alabama. So far as known, the most extensive deposits are in Ohio, Indiana and Illinois, where this coal is mined on a large scale. Various deposits have been found in Oklahoma, Kansas and other states west of the Mississippi, and there are coal measures of great value in Alaska.

Semibituminous Coal. This is similar to bituminous coal in appearance, but is intermediate between it and anthracite, and contains 70 to 84 per cent of fixed carbon, with less volatile hydrocarbons than bituminous coal. It is considered of superior value for steam-producing purposes, as it burns with little smoke and makes a hot fire. Semibituminous coal is mined principally in Pennsylvania, Maryland and West Virginia, and the United States Government employs it largely for producing steam on warships.

Cannel Coal. This is very rich in volatile hydrocarbons, and when a lump is

lighted it burns from one end to the other, like a candle. It makes a very attractive fuel for open grates, but is expensive, owing to its scarcity, being found in limited quantities only in Kentucky, Ohio and Indiana. It is used extensively as a gas enricher in making coal gas for illuminating purposes. In burning it makes a cracking or chattering noise, and is known in Scotland as "parrot" coal. Cannel coal is very compact and has an oily appearance. Some varieties are used in making ornaments, as they can be carved and take a high polish.

Brown Coal, or Lignite. This is not really a completely formed coal, but contains considerable moisture and much volatile matter. It has a woody structure, is brown in color, contains more or less earthy matter and burns with little heat. It is found west of the Mississippi River. In North Dakota, Montana and in a number of the states in the Rocky Mountains where there is a scarcity of other fuel, lignite is of considerable value. It cracks in drying and will not bear much handling nor long transportation.

DISTRIBUTION. Coal is widely distributed over the earth. The chief coal-producing countries are the United States, Great Britain, Germany, France, Belgium, Austria-Hungary and Russia. Russia has the most extensive coal fields in Europe, but they are not fully developed. Coal is known in India, the Malay Archipelago, Japan and China. China has the greatest undeveloped coal fields in the world. Italy, Spain, Sweden, Australia, New Zealand, Borneo, the Philippine Islands and many African countries produce coal, and large deposits are found in Canada, Alaska, Mexico, Chile, Peru, Colombia and Argentina.

PRODUCTION. Coal is produced by mining (See MINING, subhead *Coal Mining*). This is accomplished usually by shafts or tunnels, and in some cases from the surface. The coal is cut by hand or by machinery and loaded into suitable dump carts hauled by mules or by electric or other power. The United States produces over 500,000,000 short tons

annually, about 17½ per cent of this being Pennsylvania anthracite. The other coal-producing states in order of production are West Virginia, Illinois, Ohio and Indiana. Great Britain produces nearly as much coal, and although the coal beds are of small area, the mines have been worked to great depths, a large number of veins being operated upon. The United States and Great Britain supply about two-thirds of the world's coal output.

HISTORY. Greek historians refer to the use of coal in 300 B. C., and it was in use in Great Britain in 852, but it is not known when it was first found to be of service. The first known discovery of coal in the United States was made by Father Hennepin near Ottawa, Ill., in 1679, and the first coal mine opened was at Richmond, Va., in 1750. The first anthracite mine was operated in 1793, but as it was not known to ignite this kind of coal, it did not come into general use until later. Bituminous coal was employed in the United States as early as 1820, and with the increase of transportation its uses have multiplied until the industries of the country are practically dependent upon it.

Coal Tar, or Gas Tar, the black, thick, opaque liquid that condenses when gas is distilled from coal. It is heavier than water and has a strong odor. It is the mixture of many distinct substances, of which its further distillation produces an almost endless variety. The tar is first broken up, by what is known as fractional distillation, into five groups: crude naphtha, carbolic oil, creosote oil, anthracene oil and pitch, the last remaining in the still. Until recent years the gas tar left in the retorts of gas works was a waste product, but it now constitutes a source of great value for making an innumerable number of dyestuffs, medicines and other chemical products. See DYEING; GAS, ILLUMINATING.

Coastal Plain, any low area along the coast of a continent. It is usually built up by the sediment brought down by rivers and distributed by the waves. The term is specifically applied to the great

coastal plain of North America extending along the Atlantic Ocean and Gulf of Mexico from the latitude of New York City to that of Vera Cruz in Mexico.

Coast and Geodetic Survey, United States, a bureau in the department of commerce and labor which has charge of all the surveys of the United States and its outlying possessions. The surveys include the interior, coasts and coast waters. The bureau was organized in 1807 and placed under the treasury department, but little was accomplished by it previous to 1832. Since then its scope has continually broadened. In 1878 it was named the Coast and Geodetic Survey, and in 1903 it was placed under the department of commerce and labor. The bureau has made a minute survey of the coasts and mapped the same, together with the coast waters, as far as necessary for the purpose of navigation. It has made a similar survey of Alaska and some of the island possessions. It has marked a series of levels over the eastern half of the country, including the Great Lakes, and completed important triangulations across the United States along the 39th parallel and the 98th meridian. These triangulations, the last being completed in 1911, form the basis of most other surveys. The bureau publishes charts and tide tables for all the principal parts of the world and for many parts of minor importance. It also issues an annual report.

Coast Range, a range of mountains of western United States extending almost parallel to the coast through California and Oregon and into Washington. In Washington the northern mountains are called the Olympic Range, while those of British Columbia and Vancouver are grouped in the Cascade Range, which is properly a part of the Coast Range. The highest mountains of the range are from 7000 to 8000 ft. in height and have glaciers of some size. The valley between the Coast Range and the Sierra Nevada is the most fertile region of California and is remarkable for its picturesque beauty. Some of the familiar peaks of this range are: Hamilton (4208

ft.), on which the Lick Observatory is located; Mt. Tamalpais (2606 ft.), rising above San Francisco Bay; and Diablo (3855 ft.). The San Bernardino Mountains of southern California are sometimes considered a part of this system.

Coatesville, Pa., a city of Chester Co., 38 m. w. of Philadelphia, on the West Branch of the Brandywine Creek, and on the Pennsylvania and the Philadelphia & Reading railroads. It is noted as an industrial center and contains rolling and paper mills, brick and lime kilns, steel plants, boiler works, silk and woolen mills, etc. Coatesville was settled in 1800 and incorporated in 1867. Population in 1920, U. S. Census, 14,515.

Co'balt, Ko'balt, a white, hard metal resembling zinc in appearance, never found free in nature and only sparsely in compounds. It is highly magnetic at both ordinary and high temperatures. Its compounds, fused with borax and with potash, form the clear blue mass from which the pigment called *cobalt blue* is obtained.

Cobb, Henry Ives (1859-), an American architect, born at Brookline, Mass. He studied at the Massachusetts Institute of Technology and at Harvard, and in 1881 established himself in Chicago, where he has been very successful. He was a member of the National Board of Architects of the World's Columbian Exposition in 1893, and has since become a special architect for the United States Government. Chief among the important public buildings which he has designed and erected, are: the American University, Washington, D. C.; at Chicago, several government buildings, some of the buildings of the University of Chicago, Newberry Library, the Chicago Athletic Association Building and the Church of the Atonement; and the Yerkes Observatory, Williams Bay, Wis.

Cobb, Howell (1815-1868), an American statesman, born in Jefferson County, Ga. He graduated at Franklin College in 1834, studied law and was admitted to the bar in 1836. He entered Congress in 1843 and served until 1851, be-

coming speaker of the House in 1849. In 1851 he was elected governor of Georgia, again entered Congress in 1855 and was secretary of the treasury from 1857 to 1860. He resigned when Georgia was about to secede, and was appointed brigadier-general in the Confederate army, later becoming major-general, but he did not see active service. He was an advocate of states' rights and was strongly opposed to the reconstruction policy of Congress.

Cob'den, Richard (1804-1865), an English statesman and a champion of free trade. After severe poverty he entered his uncle's office in London, and later visited Scotland and Ireland as a commercial traveler. In 1828 he entered into partnership to sell calicoes; then took up calico printing and settled in Manchester. He traveled in the United States in 1835 and later went to the East. As the result of these travels, he wrote two pamphlets, *England, Ireland and America* and *Russia*, which attracted the attention of the political world. In 1838 the Anti-Corn League was formed and Cobden lectured in its support all over the country. Sir Robert Peel acknowledged that it was chiefly due to Cobden's clear arguments that the Corn Laws were abolished as early as 1846. He spent his time either in Parliament or, when out of office, in spreading his views on the Continent. He visited the United States a second time and in 1860 negotiated a commercial treaty with France, which led to increased trade and good feeling between the countries. During the Civil War in the United States, Cobden was a zealous advocate of the North. He was the first to realize that the interests of nations are not opposed to each other, but that they are in harmony, and it was on this ground that he advocated as wise political measures free trade, peace and economy.

Co'bra, a genus of deadly serpents of the Elapid Family, found in southern Asia, Africa and Malaysia. There are ten species, all of which are able by a spread of the ribs to expand the neck into an enveloping hood. When an-

nayed, the cobra coils the lower part of the body but rears the head and one-third of its length, a position which it will retain for hours or until the removal of its enemy. It is one of the most vicious of serpents, but on account of its short fangs is easily protected against.

The spectacled cobra is so called because of the peculiar markings upon the back of the head. The Egyptian cobra is supposed to be the asp of Cleopatra. The king cobra is the one used most frequently by snake charmers who take advantage of its habit of swinging from side to side before striking.

Co'ca, a shrub growing in Bolivia and Peru and belonging to the Balsam Family. It is a low plant rarely growing more than 20 ft. high, and bearing oval, pale green, almost stemless leaves. The flowers are white and grow in pairs upon the stem either in the axils of the leaves or in places where leaves might have been expected to appear. The blossoms are delicate, with spreading petals and protruding stamens. The fruit is a pod which, when ripe, bursts open to scatter the seeds. The dried leaves of the coca produce a powerful stimulant and are the source of our drug, cocaine. The natives of South America chew the dried leaves for their stimulating effect, but the drug extracted is used as a local anæsthetic.

Cocaine, *Ko' ka in*, a stimulating drug made from the leaves of the Peruvian coca. It is used in dentistry and medicine as a local anæsthetic or as a nerve stimulant. Taken in large doses it has an intoxicating effect, but in small quantities it produces a feeling of elation and moderates sensations of cold, hunger and weariness. The cocaine habit is often acquired through the taking of patent medicines which contain small quantities of cocaine; it is a particularly dangerous habit since it weakens the will, warps the judgment and seems to destroy all sense of moral obligations. The United States Government is attempting to regulate the sale of cocaine by legislative measures. See COCA.

Coccus, *Kok'us*. See SCALE INSECT.

Cochin, *Ko'chin*, China, a French state in Indo-China, bounded on the n. by Cambodia and Annam, on the s. and e. by the South China Sea and on the w. by the Gulf of Siam. In general physical character, the country is an alluvial plain that includes the fertile delta of the Mekong River. At the south it is swampy; farther in the interior is a region of jungle forest, where typical animals of the wilds abound. In the extreme north the land rises to a height of 3000 ft., but the climate is everywhere unhealthful. Rice, sugar, tobacco and cotton are the principal crops. Tropical fruits, nuts and spices are raised for domestic use.

The people are chiefly Annamites, Chinese and Cambodians. The French have established many schools and professional colleges and are training native teachers. Irrigation and draining projects are also on foot for reclaiming the fertile marsh land. The state is divided into 21 provinces, and the colony has one deputy in the French Chamber. Saigon is the capital and Cholon is one of the important cities.

Cochineal, a small insect from which are produced scarlet, crimson and orange dyes. It is also used in the preparation of lake and carmine. The cochineal is native in Mexico and Peru, where it lives upon the cactus plant. The females alone are used in the production of dye. These are brushed carefully from the leaves into sacks and killed by heat. The dead insects form a sort of granulated powder requiring about 70,000 insects to a pound. The use of the cochineal as a dye was first known in Peru, and from there it was introduced into Spain as early as the 16th century. Recently the insects have been brought into the cactus regions of southern United States and are propagated for use in calico printing and dyeing.

Cock'atoo', the name given to a family of parrots, which inhabit New Guinea, Australia, the Philippines and adjacent islands. The principal characteristics of the family are the large crest on the head, the heavy, hooked bill and the large tail which may be square or rounded at

the end. The nest is made in hollow trees or in crevices in rocks. Unlike the other parrots, the cockatoos seldom learn to talk, the usual note being a harsh cry. A number of species of this family are favorite birds in zoological gardens, one of the most familiar being the sulphur-crested cockatoo, which is a native of Celebes and the Togia Islands. The bird is whitish or pinkish, with a large sulphur-colored crest. The largest of the cockatoos is known as the black cockatoo, which is a native of northern Australia. It is glossy black, with a bare, red patch on each cheek. The bill is very large, especially the upper mandible, which extends far below the lower mandible. These birds feed on fruit, as well as insects, and in parts of Australia do considerable damage to the crops. Like many other parrots, the cockatoos occur in large flocks.

Cockchafer, *Kok'cha'fer*, a group of beetles of the Scarabæid Family. The members of this group live upon flowers and leaves, and occasionally appear in such numbers as to be great pests. They have big, shining bodies, sometimes covered with scales, and long, seven- to ten-jointed antennæ ending in a feathery enlargement which is larger in the males than in the females. The claws are often unequal in size. Cockchafers are nocturnal insects, generally abundant throughout the spring and summer months and found in almost all temperate climates. Many are brightly colored, but some are dark brown or black. Their backs have three raised ridges, from beneath which the abdomen extends in a long or short point. The larvæ are soft, white-bodied "worms" found in roots of plants, where they live for three or four years before developing; hence cockchafers appear commonly only after intervals of that length. Rooks, gulls, moles, owls and bats are their chief enemies.

Cock'lebur", or Clotbur, a coarse weed of the Composite Family, growing on sandy, waste ground everywhere in eastern and southern United States. It is a branching herb with toothed or lobed leaves and heads of greenish, insignifi-

cant flowers, followed by a small burlike fruit which has hooked appendages that are apt to cling to passing objects and by them be carried to great distances. By its persistence the cocklebur has secured wide distribution. Along with all bur-bearing plants, the cocklebur is often called stickseed, a name which typifies its chief characteristic.

Cock of the Rock, a bird of the Chat-terer Family. These birds are larger than the robin (about 13 inches long), and are peculiar in having a large, fan-shaped crest of feathers on the head, extending from the end of the bill to the back of the head. The males are orange or red in coloration, while the females are brownish. Three species are known, and are more or less common in the mountains from Venezuela to Bolivia and Brazil. The most brilliant species is blood-red, and is found in Ecuador and Colombia. The nest is placed on the face of a rock, in crevices, holes or cracks in rocks. It is made of clay, lined with green moss, and contains two eggs, pale buff, spotted with reddish-brown.

Cock of the Woods. See CAPERCAIL-LIE, *Kap" er kale' yi*.

Cock'ran, William Bourke (1854-), an American lawyer and congressman, born in Sligo County, Ireland. He was educated in France and Ireland. In 1871 he came to the United States, taking a position as teacher in a private school. He was admitted to the bar of the Supreme Court of New York in 1876 and has practiced since then in New York City. He served in Congress from 1887 to 1889 and again from 1891 to 1895, as a Democrat, and was a member of the commission on revision of the constitution of New York. In 1896 he influenced public opinion in favor of intervention to rescue Cuba, but later was opposed to the conquest of the Philip-pines and campaigned for Bryan in 1900. He was chosen in 1904 to fill the vacancy in Congress caused by the resignation of G. B. McClellan; and was re-elected to the Fifty-ninth and Sixtieth Congresses. In 1912 he joined the Roosevelt wing in the Republican split of that year.

Cockroach, a family of insect pests of the order Orthoptera. Three species of this family are commonly known in the United States and are looked upon with great aversion because of their voracity and their stealth. They may be winged or wingless, but their flat, furry bodies of chocolate-brown or black color are of the best form and texture to enable them to escape quickly and conceal themselves in narrow cracks. Cockroaches like dampness and warmth in their surroundings, but are not particular as to their diet; greasy dishclothes, leather, living insects even of their own family and all forms of vegetables are equally acceptable to their taste. Of necessity the cockroach has strong jaws and active claws.

Cockroaches infest old houses, the holds of vessels, decaying tree trunks, water pipes, shops and damp storehouses. A campaign of continued and unremit-ting cleanliness, combined with the use of any of the cockroach poisons sold in the market, is efficacious, but must be carried on with vigilance perhaps for many weeks. To the credit of the cock-roach, its zeal in exterminating bedbugs should be mentioned. The Oriental cock-roach is frequently known as the black beetle, and the German cockroach, which is the smallest and the most commonly known, is often spoken of as the Croton bug because of its occurrence in the water pipes in New York City. See INSECTICIDE.

Cocoa, *Ko'ko*, or *Cacao*, *Ka ka' o*, a small tree of the Sterculia Family, probably native in Mexico or Central America and known in the United States through the extensive use of its products, cocoa and chocolate. The cocoa is a small, spreading tree growing generally not more than 20 ft. in height, though some-times reaching 40 ft. The stem is straight but branches, forming a regular, shapely tree with shining, oval leaves which are deeply-veined, dark green above and red underneath. The flowers and fruit are most peculiar in their position, for instead of growing among the leaves, they spring directly from the

trunk or from the older branches, and are almost stemless. The blossoms are small and surrounded by five stiff, rough sepals. There are also five petals which are narrow and bright red. In front of each is a stamen which is broad at the top and base but threadlike in the center. The fruit, which is the commercially important part of the tree, is first green, then red or yellow in color. When ripe it is about the size of a small cucumber and is marked with deep, lengthwise grooves. The outer covering is somewhat woody, and within are five, or sometimes eight, rows of white or pale purple beans, embedded in a sweet pulp. The pods generally contain about 60 beans each.

The cultivation of cocoa, or cacao, is an extensive industry in moist, warm countries, where the soil is rich and well-drained. The leading countries in its production are Ecuador, Brazil and St. Thomas Island near the coast of central West Africa. All of the Central American countries and Ceylon are also well-known producers. The plants are sown in nurseries, where they are carefully tended until they are one foot high, or they may be planted among banana or cassava trees where they are shaded until they are able to bear the heat. The fruit is borne when the trees are about five years old.

The process of preparing the seeds for shipping consists of three steps—picking the pods, extracting the seeds and curing them. The pods are picked carefully in order to avoid injuring the next season's buds, and are left upon the ground to be opened by women and children, who follow the pickers and scoop out the beans and their enveloping pulp. The rinds are left upon the ground to enrich the soil. The wet beans are placed in a sweating house where they are turned at least once every 24 hours for three days. This process is a sort of fermentation which helps to remove the pulp, improve the color, sweeten the flavor and toughen the skin. The beans are next dried, though on some plantations a process of washing precedes this. The drying is

done either artificially or by the sun, and differs in time according to the method used; in general, the beans are spread on platforms resembling broad, flat cars, so that they may be rolled in from too great heat or protected from rain. In other places the drying sheds have removable roofs which serve the same purposes. When the beans are thoroughly dry, some plantation owners employ "dancing" coolies who dance upon the platforms of beans to remove any last vestiges of the pulp and to polish the beans so that no mildew will be attached. They are packed in bags or barrels to be shipped. Hamburg is the chief port of import, Havre and New York follow and London is fourth in amount received. From these ports they are sent to the large plants where chocolate, cocoa and cocoa butter are prepared.

As a food product cocoa is extremely valuable. Fully half of its composition is fat; starch and proteids form 32 per cent, and but two per cent is theobromine, or the stimulating principle similar to the caffeine of coffee; the remainder is mineral matter and water. In preparing the cocoa beans for use the chief difficulty was to remove the right proportion of fat, which, though of value as a food, was present in too large quantities for ordinary use. Van Houten, a Dutch manufacturer, was the first to find a process which was both feasible and efficacious. His process is still in use and he may be said to have been the inventor of our present cocoa, or "chocolate powder," as he called it. The raw beans are first cleaned and carefully sorted according to size, then roasted. When thoroughly browned the tough skins or shells, which form the one waste in the manufacture, are broken and removed. The broken beans are ground, spice and sugar added, or if cocoa is to be made the fat is removed, and the product is molded and packed. Chocolate is simply cocoa mixed with spices and sugar; it is generally sold in bars, tablets or odd shapes. Cocoa, for making the drink called cocoa, is commonly sold in powdered form.

COCONUT

The fat, which is removed, is sold under the name of cocoa, or cacao, butter. It is a white, hard fat which does not become rancid and which is used as a foundation for creams, pomades, cosmetics, etc.

The shells, which are in most places a total waste, are sometimes roasted with coffee to add to its flavor, sold as coco tea and used by peasants as a substitute for tea and coffee, or coated with sugar and put on the market as a sweetmeat.

Coconut, *Ko' ko nut*", or **Cocoanut**, a tree, or the fruit of this same tree, of the Palm Family, growing in tropical countries and especially upon tropical islands. The tree is tall, straight and unbranched, bearing at its summit a crown of long, feathery leaves and branches of inconspicuous flowers which have to be fertilized by the wind. The fruit, commonly called a nut, is round, covered with a hard but fibrous coat enclosing a milky liquid, which is nutritious and pleasant to the taste, especially in the green fruit. The white, fleshy part of the fruit is edible and widely exported. In the United States it is familiar in the market as a whole fruit or in dessicated or shredded form. In the latter forms it is used for culinary purposes and for sweetmeats. The shell of the coconut is woody, and, since the trees generally grow near the coast, these palms have been scattered by the nuts floating to far distant islands, where they find lodgment and produce new trees. From the fiber of the nut, which is called coconut fiber or coir, rope and matting are made. See **COIR**.

Cod, a widely-known family of fish living in colder parts of the oceans and including many of the most important food fishes, as the common cod, the haddock and the hake. All have long, tapering bodies, large mouths, long gill openings, three separate dorsal fins and a large or small barbel, or sensitive feeler, upon the chin. The true cod is the fish widely known through its exportation in salted form, and the cod fisheries are among the important American industries. They are carried on extensively along the Newfoundland Banks and New

CODLING MOTH

England coast. Cods have moderate-sized mouths, plainly-marked ventral lines and rarely more than seven rays in the ventral fins. In color they are variable, being greenish, brown, or yellow with paler spots and darker fins. Their ordinary weight is from 10 to 20 lb., but much larger ones are caught. The largest recorded catch weighed 211 lb. and was six feet in length. Much labor has been expended by both the European and the United States governments in propagating the cod and introducing it into all waters where it can find conditions suitable for its growth. In response to this effort the cod industry is the most rapidly increasing of the United States fisheries. Upon the inland markets the fish is sold as boneless cod, shredded cod and salt cod. See **FISHERIES**.

Codd'ington, William (1601-1678), one of the founders of and the first governor of Rhode Island, born in Boston, Lincolnshire, England. He came to Massachusetts in 1830, landing at Salem with a commission as magistrate, and remained in the vicinity of Boston for several years. Later he moved to Aquidnek, or Rhode Island, and there, with 18 others, founded a colony in 1638. In 1640 Coddington was elected governor and held the office until 1647, at which time the colony was incorporated in the charter with Providence Plantations. He joined the Quakers in 1666, became governor again in 1674 and continued in that office until his death.

Code Napo'leon. See **LAW**, subhead *Code Napoleon*.

Co'dex, the name given to wooden tablets, and later to manuscripts, both secular and sacred. The monks illuminated or decorated many of these codices. Of the secular codices, the *Codex Theodosianus* and the *Codex Justinianus*, treating of civil law, are among the most notable. Of the sacred codices, the *Codex Alexandrinus*, one of the numerous manuscripts of the Bible, is among the most important. See **BIBLE**.

Cod'ling Moth, one of the most harmful moths of the orchard and a member of the Leaf Roller, or Bell Moth

Family. It attacks apples by depositing a single egg at the point of the fruit where the blossom has fallen off; in a few days the larva hatches and, after feeding for two or three days upon the outside of the fruit, burrows into the core and is the familiar white apple worm of the orchard. Its feeding and tunneling cause the fruit to fall or, at least, renders it of poor value. When ready to transform to the pupa state, the worm emerges and creeps into crevices of the bark or rolls itself within a leaf. Two broods appear each season; the second generation of pupæ remain in the cocoon over winter and hatch in the spring into small, beautifully mottled moths, with broad forewings having a large, brownish spot near the edge.

To rid the orchard of these pests, the trees should be sprayed with Paris green just as the blossoms fall, as then the tiny apples stand upright upon the stem, and the poison is held in the erect, adhering calyx. Thus the first meal of the hatching larva is apt to prove its last also. Under favorable conditions, that is, dry weather and little wind, one spraying should prove sufficient, if done at the proper time. To insure safety, however, two sprayings at short intervals are advisable. These can avail only if done before the larva bores into the fruit. Old trees with decaying trunks and branches, discarded barrels and crates and wind-falls from the trees should be carefully collected and destroyed, as they all prove to be retreats for larvæ or pupæ. See INSECTICIDE.

Cod-Liver Oil, a heavy, cream-colored oil pressed from the livers of a number of species of cod. It is used as a tonic in alimentary diseases and is sold in bottles or in capsules; owing to its oily, disagreeable taste and odor the latter is the preferable form. Cod-liver oil is prepared in the United States and Canada.

Co'dy, William Frederick (1846-1917) an American scout and showman, known as "Buffalo Bill," born in Scott County, Iowa. Until the outbreak of the Civil War, he lived among the Indians of the

western frontier. He then became a Union scout and later, while guarding the construction of the Union Pacific, earned his sobriquet by killing over 4000 buffaloes in 18 months. This was done to fulfill his contract to furnish meat for the laborers engaged on the road. He has participated in numerous Indian battles, and in 1883 became head of the "Wild West Show."

Cœlenterata, *Se len" ter a' ta*, one of the great groups of the animal kingdom. It is made up of those many-celled animals whose body consists of two distinct cell layers, known respectively as the ectoderm and the endoderm. Although there is no true bodily cavity containing organs, there is a centrally-located space in which both digestion and circulation take place. The nervous system is either entirely lacking or of only slight importance. The group Cœlenterata includes such low orders of life as the hydras, jellyfish, sea anemones and coral polyps, each of which is described under its title.

Cœur d'Alene, *Kur da lane'*, Idaho, a city of Kootenai Co., at the extreme north end of Lake Cœur d'Alene, on the Northern Pacific, the Spokane & International and other railroads. The Spokane Electric Line also connects the city with the adjoining chief towns and villages. Cœur d'Alene has an altitude of 2155 ft. above sea level. Beautiful Cœur d'Alene Lake, on the shore of which the city is located, is forty miles long and has over four hundred miles of shore line. Tributary to the city are many thousands of acres, which are irrigable and produce fine fruits and vegetables. Cœur d'Alene contains model water and sewer systems, a number of sawmills, good municipal buildings, several banks and churches, numerous hotels, a public library and substantial business houses. There is an excellent public school system with well equipped buildings and modern courses of study. The Academy of the Immaculate Heart of Mary (Catholic) is also located here. The Cœur d'Alene Indian Reservation is in Kootenai County. The chief industries are lumbering, mining

and agriculture. The city has risen rapidly in point of population and importance from a small village in 1900. Population in 1920, 6,447; including the immediate vicinity, 10,000.

Cof'fee, an evergreen shrub of the Madder Family, valuable commercially because of its seeds or "berries" which are the source of the popular drink having the same name. The two chief species of the coffee plant are the Arabian and the Liberian, and the most of the different blends which may be purchased are derived from these through dissimilarity of the climates in which they are grown, methods of preparation and size of berry. The Arabian coffee plant grows from 15 to 18 ft. in height and is a shapely, treelike shrub with slender branches and pointed, oval leaves. The fragrant white flowers grow in clusters and are exceedingly short-lived, often lasting but a day. The fruit, which develops some seven or eight months after the flower falls, is a cherrylike, fleshy berry, dark crimson when ripe; within the pulp lie the two seeds, covered by a dry, tough skin, called the parchment, each separately wrapped in a tissuey "silver skin." These seeds, or "berries," lie with their two flat sides together, or in case only one seed develops the berry is round and is sold under the variety called peaberry, a very desirable brand. The Liberian plant is larger in every way, has tougher roots and is more able to resist disease; its value, however, is lessened by the poorer flavor of the berry. Attempts to produce plants combining the best qualities of both species are meeting with some success.

Coffee plants are raised in large plantations where the growth is carefully watched. They are planted about three feet apart and require shade and plenty of moisture. The time and manner of harvesting the crop depends much upon the country in which the plant is grown and upon the planter. To prepare the coffee berries for export, only the ripe fruits are gathered; this is often done by merely shaking the trees, though in some cases they are hand-picked. The

pulpy covering is removed by one of two methods, the wet or the dry. The former is the more expensive but is becoming the more popular. By this method the cherries are carried by running water into large tanks where the smaller, lighter cherries float, and the larger ones sink and are drawn off into pulpers; these are large, revolving cylinders with space between them too small to allow the passage of the pulp-covered seeds. Through these the seeds pass to washing vats, after which the remaining particles of pulp are fermented off, leaving the seeds covered by the tough parchment. Occasionally this parchment is not removed until the berries reach the roasting station, where the last three stages—peeling, sizing or sorting according to size, and roasting—are carried on. Here also the various blends are prepared.

The chief coffee-producing country is Brazil; Arabia, the West Indies, Java, Mexico and Ceylon are close competitors, and the United States Department of Agriculture is experimenting to find where and under what conditions coffee may be profitably raised in the United States. This is a worthy effort, since the United States imports one-half of the world's crop, the average yearly consumption here being 12 lb. per person, an average exceeded only by the people of Sweden and Holland.

Cof'ferdam", a wooden structure formed in water to procure a dry foundation for the masonry of walls and piers for bridges. It is generally composed of several rows of piles set close together, with clay, rock and sand packed between to keep out the water. See **CAISSON**.

Coffeyville, Kan., a city of Montgomery Co., 170 m. s.w. of Kansas City, on the Verdigris River and on the Missouri Pacific, the Missouri, Kansas & Texas, the Atchison, Topeka & Santa Fe, and the St. Louis, Iron Mountain & Southern railroads. An interurban electric railway connects the city with Independence. Coffeyville is situated in a region noted for its natural-gas and oil deposits; and it has 3 large oil refineries,

COFFEE



The coffee tree grows from 15 to 18 feet high. It has bright green leaves and bears clusters of fragrant white flowers. The fruit, when ripe, resembles a dark red cherry. It contains two seeds which form the coffee of commerce.



The ripe fruits are picked by hand, or gathered by shaking the trees. The picture shows the coolies picking the fruit on Sir Thomas Lipton's estate in Ceylon.



Some growers soak the berries in tanks of water until the pulp is loosened from the seed, when it is separated by treading the berries with the bare feet. The pulp and seeds are then separated by washing.

COFFEE



After picking, the berries are dried by spreading them on flat surfaces where they are exposed to the sun. During the drying, workmen frequently shovel them over so that all berries are exposed to the sun.



In Java and other Eastern countries the seeds are obtained by pounding the dried berries in large mortars. The dried pulp is broken off, leaving the seeds free.

COFFEE



The more modern method is to remove the dried pulp by machinery.



The seeds, commonly called the "coffee bean," are carefully sorted and graded.



The coffee is then packed in large sacks and is ready for shipping.

NOVELTIES OF THE FAR EAST



IN BURMA THE ELEPHANT IS A VALUABLE BURDEN BEARER



A WEDDING IN JAVA

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The bride and bridegroom are easily distinguished by their peculiar headdress.

a zinc-oxide smelter, the largest in the country, grain elevators, flour mills, brick plants, hollow tile manufacturing plants, oil specialties plants, and a plow factory. There are also planing mills and a packing plant. The city contains a fine Y. M. C. A. building and has a public library. Coffeyville was settled in 1869 and named in honor of A. M. Coffey, a member of the State Legislature. In 1871 it was removed about one mile from the original site and in the year following received its first city charter. It is operating under the commission form of government. The population in 1920, U. S. Census, was 13,453.

Cof'fin, the case in which a corpse is placed for burial. It is usually a long box tapering to both ends, from the point where the elbows rest. One of the first-mentioned coffins of history is that of Joseph, spoken of in *Genesis* L, 26. In early times only persons of note were buried in coffins, and these were variously made of glass, wood or a rude earthenware. The Greeks buried their dead in a coffin of a kind of limestone, known as sarcophagus, and from that custom the word *sarcophagus* began to be used synonymously with coffin. Modern coffins, usually called caskets, are made of wood, metal or cement suitably covered and lined.

Coffin, Charles Carleton (1823-1896), an American war correspondent and writer, born at Boscawen, N. H. Coffin spent his early years on a farm and did not secure much schooling. He was, however, a young man of great perseverance and considerable ability, trying his hand at civil engineering and telegraphy as opportunity offered, but finally going to Boston and fighting his way into journalism. During the Civil War he acted as correspondent for the *Boston Journal*. He was on the field at Antietam, Gettysburg, the Wilderness and elsewhere, giving vivid reports of many famous battles. He also reported the Austro-Prussian War, made a tour of the world and returned by way of San Francisco and the Great Plains. Coffin was for some

time a member of the Legislature of Massachusetts. He was also an interesting lecturer, and wrote several books, among which are *Life of Garfield*, *Following the Flag*, *Winning His Way*, *Boys of '76*, and *Building the Nation*.

Coher'er. See TELEGRAPH, WIRELESS.

Cohes'ion, the attraction which holds together particles, or molecules, of the same substance. It acts only feebly in gases, somewhat more strongly in liquids and with great strength in solids. Solids are said to be hard when their cohesive force is great. Heat decreases the power of cohesion in substances, since as the temperature rises the molecules become more active. In small masses, as in drops of dew, particles of mercury, drops of melted lead in the manufacture of shot, etc., the forces of cohesion give the drop a spherical form. The forces of adhesion and cohesion are essentially the same, but the former acts only between molecules of like substances. See ADHESION.

Cohoes, Ko hoze', N. Y., a city of Albany Co., at the junction of the Hudson and Mohawk rivers, and on the Delaware & Hudson and the New York Central railroads. The Champlain and Erie canals pass through the city, uniting a short distance to the south. The city has abundant water power furnished by the Mohawk, here crossed by a long railroad bridge affording a view of the falls, which are 75 ft. high and 900 ft. wide. Cohoes was for many years a part of the Rensselaer Manor. It is a noted manufacturing center, its industrial establishments including large cotton mills, knitting mills, wall paper, paper stock and brick factories, machine shops, roller mills, etc. Population in 1920, 22,987.

Coin'age, a term used to designate metal money (See MONEY, subhead *Coinage*); also to designate the act of process by which metal is converted into money (See MINT).

Coir, or. **Coconut Fiber**, a fiber obtained from the outer husk of the fruit of the coconut palm. This fruit, which is the ordinary coconut of the market, is covered by a fibrous husk which must

be separated from the inner nut in order to prepare the fiber for use. In Ceylon, where the coconut palm is extensively grown, the natives force open the shells by pushing a pointed stick against the soft round circle near the apex of the fruit. The husks are then soaked in tanks and beaten until the fibers are completely separated from the tissues. After being thoroughly dried they are the foundation for a coarse, stiff fiber used in the East for making the rope employed where it needs to withstand the action of sea water. Lately the making of coir has become a European industry, and machinery is used in its manufacture. See COCONUT.

Coke, the residue, or solid portion of coal, remaining after the gases and other matter have been consumed by heat. Good coke is of a gray color, has a silvery luster, and rings, when struck, with a metallic sound. In smelting metal ores and in the melting of iron and steel it is generally employed instead of coal or wood, as it burns with a pure flame free from smoke. It is produced by burning bituminous coal in coke ovens, those of the beehive type being ordinarily used, but where it is found desirable to collect and utilize the gas and other waste products, a special form is employed. A good coking coal should yield 65 per cent of its weight in coke. The coal is washed, screened and assorted as to sizes before it is put into the coke ovens. In up-to-date plants all this is performed by machinery. Coke is also produced in plants making illuminating gas. It remains in the retorts accompanied by coal tar and other products. Coke is made on a large scale in England and Pennsylvania, West Virginia, Alabama and Tennessee. See CHARCOAL; COAL; COAL TAR; GAS, ILLUMINATING.

Coke, Thomas (1747-1814), one of the first bishops of the Methodist Episcopal Church, born in Wales. He was educated at Oxford, and was ordained in the Church of England in 1770. In 1776 he met John Wesley, began way-side preaching, was dismissed from his curacy and joined the Methodists. In

1782 he became president of the Irish Conference and in 1784 he and Francis Asbury were made joint superintendents of the Church in America. Coke returned to England in 1785 and spent the remainder of his life in visiting and preaching in the United Kingdom and in America, making in all nine voyages to America. He assumed the title bishop in 1787. When Wesley died Coke became secretary of the British Conference, and he and Asbury edited *The Doctrine and Discipline of the Methodist Episcopal Church of America*.

Co'la, or Kola, a tree of the Sterculia Family and native in tropical Africa. The trees are not large, and have narrow, undivided leaves which are long and of shiny green color. The flowers grow in fine clusters from the axils of the leafstalks. They are without petals but have a colored, bell-like calyx which takes their place. The fruit is a large, woody nut, yellowish-brown in color, and contains many white or crimson seeds, called cola nuts. These seeds contain the same stimulating properties as coffee and cocoa, and are chewed for medical purposes by the natives of the tropics. Lately they are being exported to the United States, where they are also used in medicines and stimulating drinks. The correct name of the tree is the bichea, but it is also called the bissey and the gooroo, or guru.

Colbert, Kol'bar, Jean Baptiste (1619-1683), one of the greatest French statesmen. He was in the war office at 20, under Le Tellier, and by 1651 he had entered service under Mazarin, who soon recognized his ability. In 1661 he became the chief minister of Louis XIV. He found the finances in a sad state, but introduced order and economy with such success that in ten years he had increased the annual revenue 20,000,000 livres and decreased the cost of collection 25,000,000 livres. His reform extended also to agriculture. He developed the commercial interests of the country by building roads and canals, and he replaced the few rotten ships by one of the best fleets of the age. He organized the colonies

already in existence and founded new ones. Colbert was a generous patron of the arts and sciences, founding the academies of Inscriptions, Science and Architecture. He succeeded in developing the national resources of France during the early part of the reign of Louis XIV, but the wars and the extravagance of the latter part oppressed the people with heavy taxation and undid all his work.

Colchicum, *Kol' ki kum*, or **Meadow Saffron**, a poisonous plant of the Lily Family, which derives its name from the ancient country of Colchis, the land of sorcery. The plant springs from a small bulb and has long, flat leaves and a single crocuslike blossom. The bulb is the source of the drug, colchicum, which is prescribed in cases of gout and used as a flesh reducer. Colchicum is native in Mediterranean regions. When grown in the United States, it is often locally known as autumn crocus, meadow crocus and fog. See **GROCUS**.

Cold Harbor, Battles of, a series of engagements of the Civil War, fought from June 1 to 12, 1864, between 120,000 Federals under Grant, and 100,000 Confederates under Lee. Lee had taken up a very strong position at Cold Harbor, where it was possible to attack him only in front. Several assaults were made upon him by the Federals, however, and the main one, June 3, which lasted but half an hour, was the bloodiest engagement of American history. The Union men were violently repulsed, as had been expected, with a loss of about 12,000 soldiers, which was 20 times greater than Lee's. After a week more of desultory fighting, Grant determined on a change of base and began a flank movement toward Richmond. The advantages of the Battles of Cold Harbor, other than those of relative loss, were in favor of the Confederates.

Cold Storage, a system of preserving stored articles which would otherwise spoil, by artificially lowering the temperature of the air. It is being made great use of in the United States in storage rooms, breweries, dairies, packing houses, ice-cream factories, refineries, soap fac-

ories, morgues and confectionery establishments. The same methods of lowering temperatures are also employed in cooling hotels, theaters, iron and steel mills and other large buildings during heated weather.

The method of cooling the air is based upon the well-known fact that in the evaporation of liquids heat is absorbed from surrounding objects and their temperature is consequently lowered. In the United States ammonia is the agent commonly employed. Briefly the method is as follows: the ammonia is evaporated and condensed to remove impurities; the liquid is then passed through a needle valve and is forced in gaseous form between pipes of brine from which it absorbs the heat. These pipes, circulating through the storage rooms, bear the cooled liquid which is to lower the temperatures. Different rooms are arranged in such a way that they may be cooled to different temperatures; thus butter is kept near a zero temperature, eggs and milk at a higher point, furs and woollens, which are to be protected from moths, at a still different one, and meats, fish, etc., are kept frozen. In shipping fruit and vegetables cold storage is of the greatest importance, for without it many such products could not be preserved through long journeys. Cars equipped for this purpose are known as refrigeration cars, and refrigeration ships are employed to carry meats from the United States to European ports, and fruits and meats from Australia and Argentina.

Cold Wave, a term applied in the United States to the masses of cold, dry, clear air which flow in a southerly and southeasterly direction from the region of Canada and which often extend as far south as Yucatan. The layer of cold air is very shallow, rarely rising to an elevation of 5000 ft. Its front limits are well defined, and it moves with such steady progress from day to day that its coming can easily be predicted by the weather bureau. Cold-wave areas are usually elliptical in shape and have been known in some cases to extend over 1,000,000 sq. m. of territory. As de-

fined by the United States Weather Bureau, a cold wave implies a drop of 20° within 24 hours; and the prediction of such a decrease in temperature is officially indicated by the cold-wave flag, a white flag with a black square in the center. See WEATHER BUREAU; NORTH-ERS.

Coleman, Kathleen Watkins (1864-), a Canadian journalist, generally known as "Kit Coleman," born in Ireland and educated in Dublin and Belgium. In 1884 she came to Canada and six years later entered journalism, since when, up till her resignation in 1911, she has had charge of the "Woman's Kingdom," a department of the *Mail and Empire* of Toronto. Meanwhile, she has served as special correspondent for her paper upon such occasions as the World's Fair, Chicago, 1893, the San Francisco fair of the following year, Queen Victoria's Diamond Jubilee, 1897, and the Cuban War, Mrs. Coleman being the first woman war correspondent in the world. Independently, she has contributed to magazines and has written a series of fascinating articles on Dickensland. These were the result of research in every section of London which Dickens immortalized.

Coleoptera, Kol' e op' ter a, one of the largest groups of Insecta, including nearly 25,000 species. It includes all beetles, and the name, which means sheathed wings, refers to the structure of the forewings. Members of the group are found everywhere, living in the water, the ground, decayed vegetable matter or even in living plants. Many are exceedingly harmful, as the curculios, click beetles and wood borers. Almost all are disagreeable because of their nocturnal habits, their tendencies to creep out unexpectedly from their hiding places and their destructiveness to trees, lumber and clothing. There are four stages in the development of the beetle from egg to adult, and it is, therefore, said to have a complete metamorphosis. The mouth parts are fitted for biting, and many beetles can produce painful wounds. For descriptions of various beetles see IN-

SECTA; BURYING BEETLE; CLICK BEETLE; CURCULIO; DEATHWATCH.

Coleridge, Koler'ij, Samuel Taylor (1772-1834), an English poet and philosopher, born in Ottery St. Mary. His love for reading and dreaming attracted attention among his schoolmates, and, though he studied at Cambridge, he did not take a degree. He was ardent in his support of the French Revolutionists, and enthusiastically accepted Southey's scheme for establishing a Pantisocracy (an ideal, brotherly community) on the banks of the Susquehanna River. In 1795 he met Wordsworth, and three years later the two published the *Lyrical Ballads*, a collection of poems, four of which were written by Coleridge. Before the end of the century Coleridge had already done his greatest work as a poet, having written *The Ancient Mariner*, *Christobel*, *Dejection: an Ode*, *Kubla Khan* and *France: an Ode*. Traveling with the Wordsworths in Germany, he became fascinated with the philosophy of Kant and the other German Transcendentalists, and on his return to London devoted himself entirely to metaphysics and criticism. He lectured frequently, though without much success, but shone brilliantly in conversation. The periodical which he published, *The Friend*, resulted in failure, but in 1817 appeared the *Biographia Literaria*, his prose masterpiece. Fragments of criticism and speculation on the highest philosophical subjects appeared from time to time until his death, despite his failing health and wandering life.

Romanticism was the very breath of Coleridge's being. Unlike Wordsworth's, whose theme was the glory and the poetry of the commonplace, his field was the supernatural, to which he attempted to give the semblance of truth. The influence of his poetry was wide and permanent, for at times his meter was almost perfect and his melody almost unearthly. In literary criticism he showed an insight and a breadth far surpassing his contemporaries, and in his exposition of the aim of the *Lyrical Ballads*, in his analysis of Wordsworth's poetry and in

his Shakespeare criticism he stands supreme. As a philosopher he did not create a school, but through him the German idealistic philosophy, known as Transcendentalism, was spread in England, and he became a powerful factor for opposing the theories of Locke, Bentham and Mill. See ROMANTICISM; TRANSCENDENTALISM; WORDSWORTH, WILLIAM.

Coleridge - Taylor, Samuel (1875-1912), a negro musician and composer of ability, born in London and educated at the Royal College of Music. His father was a native of Sierra Leone and his mother an Englishwoman. Coleridge-Taylor's ability was first recognized while he was still young, and an interested friend gave him the opportunity for musical training. In 1893 he won an open scholarship in composition, and the work he produced during the following four years showed promise of his later success. His best-known composition is *Hiawatha*, a work based upon the familiar story. He was a prolific writer and composed the music for Stephen Phillips' dramas, *Herod*, *Ulysses*, *Nero* and *Faust*. Other compositions are *The Blind Girl of Castel-Cuille*, *Kubla Khan*, *Meg Blane*, *The Atonement* and *A Tale of Old Japan*, his last.

Though he was the first of the Negro race to win front rank as a composer, his work does not depend upon this fact to bring him fame. His music has marks, however, which differentiate it from the English compositions that he studied. The style of treatment, the use of orchestral color and certain features of its melody are its chief distinguishing characteristics.

Colfax, Kole' fax, Schuyler (1823-1885), an American statesman, born in New York City. Having removed to Indiana, he became editor of the *St. Joseph Valley Register* in 1845. In 1854 he was elected to Congress by the newly-formed Republican Party, serving until 1869, the last six years as speaker of the House. He was elected vice-president of the United States in 1868 on the ticket with General Grant. His later years

were mostly spent in retirement at his home in South Bend, Ind., and in delivering public lectures.

Coligny, Ko" leen' ye", Gaspard de (1517-1572), a French general and leader of the Huguenots. He came to the court at 22 years of age and formed a friendship with the Duke of Guise. He showed courage and resolution in military affairs. By 1558 he was a Huguenot, and after the death of Henry II he succeeded in gaining religious toleration for his party. When civil war began in 1562, Coligny hesitated long before taking up arms. He returned to court in 1571 and caught the fancy of the young King Charles IX by proposing a French attack on Spanish Flanders. Having aroused the jealousy of the queen mother, Catherine de Medici, on Aug. 24 he was among the first that fell in the massacre of St. Bartholomew.

College of the City of New York, The, an integral part of the public educational system of the city. One of the chief aims of the College is to prepare its students for expert work, not only in teaching, but in all the various departments of municipal administration.

The College includes: (a) The College of Liberal Arts and Science; (b) The Division of Vocational Subjects and Civic Administration; (c) The Division of Extension Courses.

From the time of its foundation in 1848 to the year 1907 the College was located at Lexington Avenue and 23rd Street. In 1907 it removed to new buildings on Washington Heights, which form, by virtue of their position and their architectural beauty, one of the most dignified and splendid ornaments of the city.

The attendance February 1919 was 10,763.

College, The Sacred, an organization consisting of dignitaries who aid the pope in governing the Roman Catholic Church. The members rank next to the pope and are "created," that is, selected, by him. In case the pope for any reason is disabled, they transact all important business. The sacred college contains 70 members when complete, and they alone

elect the pope, usually from their own number. In 1875 Pius IX made Archbishop John McCloskey of New York a cardinal, the first in the United States. At present there are three cardinals in the country.

Col'lie, a species of wolflike dog, prized by Scotch herdsmen for its traits of sagacity and faithfulness. It is a handsome dog, generally long-haired, with longer growth on the chest, the back of the forelegs and the tail. The muzzle is long and pointed, the ears are drooping at the tip but capable of erection. The legs are particularly strong and the hind ones are apt to have a double dewclaw, or rudimentary claw, at the back above the ground. In color it is generally tan and white.

The collie has unusual intelligence and a power of obstinate concentration which has made him invaluable to the shepherd. There is a saying in Scotland that it takes one shepherd and his dog or ten shepherds to bring in the flock. When designed as sheep dogs they are carefully trained during their first year; after that the master's flocks are the first care of the collie. A story full of interest and of no light literary value is Olivant's *Bob, Son of Battle*, a book whose hero is a fine Scotch collie that displays a more than human loyalty to his master's interests.

The collie has lately been brought into attention as a pet. It has been improved in appearance, has lost some of its moroseness and has become affectionate and friendly. It is considered an especially fine playmate for children.

Col'lingwood, a town in the Province of Ontario, Canada, situated on Georgian Bay, 70 m. n.w. of Toronto. Steamers connect it with the ports of lakes Huron and Superior, and it is the headquarters of the Northern Navigation Company, whose shipyards are located here. The manufacturing industries include extensive steel-shipping yards and dry docks, where some of the largest freight ships in the British Empire have been built, steel-works, tanneries, breweries a pork-packing factory and saw and planing mills. Lumber, grain and produce are the leading exports. Population, 5882.

Collins, William (1721-1759), an English poet, born in Chichester. In 1742, while still at Oxford, he wrote the *Persian Eclogues*; after going to London he published the *Odes, Descriptive and Allegorical* in 1746; three or four more odes written a few years later complete his slender contribution to literature. His mind was weak, at times to the point of violent madness; physical suffering and irregular habits brought about an untimely end. His *Elegy on Thompson, The Passions, To Evening* and *Ode on the Popular Superstitions of the Highlands* are faultless in form and reveal a genuine love for nature and the supernatural, characteristic of the early Romantic poets.

Collins, William Wilkie (1824-1889), an English novelist, born in London. He studied law and was called to the bar in 1851, but was already turning to literature, and a meeting with Dickens about this time determined his career as a novelist. He contributed many stories to *Household Words*, edited by Dickens, and published numerous novels. In 1873-74 Collins gave public readings from his short stories, in the United States. He excelled as a writer of novels in which a complicated plot, rather than character study, absorbs the attention of the reader, and while his novels are not of the highest literary value, they are masterpieces of the detective story type. Chief among them are *Armada*, *The Moonstone*, *Man and Wife*, *The Woman in White*, *The Law and the Lady* and *The New Magdalen*.

Col'linsville, Ill., a city of Madison Co., 12 m. n.e. of St. Louis, Mo., on the Vandalia and other railroads. It is the center of a coal-mining region and has zinc works, a lead smelter and manufacturing of brick. Collinsville was settled in 1800 and was first incorporated in 1830. Population in 1920, 9,753.

Collodion, *Kol lo' di un*, a clear, colorless, gummy and highly inflammable liquid produced by dissolving guncotton, or pyroxylin, in a mixture containing equal parts of alcohol and ether. Collodion was formerly used extensively in

photography. It is commonly employed in surgery, being valuable for covering cuts, scratches, etc., as it keeps out the air and poisonous substances, and is not affected by water. It is sometimes called new skin and put up in small vials. See GUNCOTTON.

Collyer, Robert (1823-1912), a Unitarian clergyman, born in Keighley, England. Collyer worked in a factory when a boy, and at the age of 14 was apprenticed to a blacksmith. He came to America in 1850 and settled at Shoemaker-town, Pa., where he worked at his trade of hammer maker and preached on Sundays for a Methodist congregation. Mr. Collyer's mind turned toward Unitarian beliefs and in 1860 he organized the Unity Church of Chicago, continuing in its pastorate until 1879, when he was called to the Church of the Messiah, New York City. His published sermons and books, especially *Lectures to Young Men and Women*, have been widely read.

Colman, Kole'man, Norman J. (1827-1911), an American agriculturist, born near Richfield Springs, N. Y. He began to practice law in New Albany, Ind., and edited an agricultural paper in St. Louis, Mo., in 1871. He was elected lieutenant-governor in 1874, and in 1885 was appointed United States commissioner of agriculture. He became the first secretary of agriculture under the law reorganizing the department.

Colocynth, Kol' o sinth, a Mediterranean herb of the Gourd Family from which the bitter drug colocynth is obtained. It is a creeping or twining plant much like the melon in habit. The leaves are broad and much-lobed, and the flowers, which grow in the axils, are tubular with spreading margins. The fruit is a spongy, six-celled melon, spherical in form and bright yellow in color. On account of its bitterness the fruit is not an agreeable food. Because of the rapid growth of colocynth and its dense shade when growing over arbors, many writers believe this was the gourd which was made to shield Jonah when he left the city of Nineveh (*Jonah iv, 5-6*), and is also the gourd whose fruits, gathered for

the prophets at Gilgal, rendered the pottage so bitter that it was supposed to have been poisoned (*II Kings iv, 38-41*). At present the fruit is the source of the bitter drug, colocynth, which is prescribed as a cathartic.

Cologne, Ko lone', a city of Germany, in the Prussian Rhine Province, situated on the left bank of the Rhine River, 44 m. by rail n.e. from Aix-la-Chapelle. At a distance the city has an impressive appearance with its medieval buildings and towers; recently proper sanitation has eliminated the evil smells of what has been known as one of the least attractive capitals of Europe. One of the finest works of Gothic architecture on the Continent, the Cathedral, or Dom, is located here. Its chief features of interest are the towers, the seven bells, the richly-colored windows and the relics of the three kings of Cologne,—Kaspar, Melchior and Balthazar, reputed to be the three Wise Men of the East. Other churches are St. Peter's, St. Martin's, St. Andrew's and the Roman Catholic Church in Deutz. Here are also the Gürzenich, where the diets of the Holy Roman Empire met, the arsenal, the Imperial Bank, the Rathaus, the Tempelhaus, the Wolkenburg, a central railway station, a museum of church antiquities, several literary and scientific institutions, theaters and schools. The *Cologne Gazette* is a newspaper of great influence and wide circulation.

The trade of the city has long been important, wine and herring being the staple articles of commerce. The weavers of Cologne were once famous; so, too were its armorers and goldsmiths. The manufactured articles include the perfume known as *eau de Cologne*, sugar, chocolate, glue, carpets, cigars and tobacco. A Roman colony was planted here as early as 50 A. D.; in 1201 Cologne was the third city in importance in the Hanseatic League. A decline began in the 16th century, when a spirit of religious intolerance closed it to the influence of the Reformation. With the beginning of the 19th century its prosperity was restored, and its recent growth

has been rapid. Population in 1910, 561,527.

Cologne Cathedral. See COLOGNE.

Colom'bia, a republic of northwestern South America, bounded upon the north by the Caribbean Sea, upon the e. by Venezuela and Brazil, upon the s. by Ecuador and Peru and upon the w. by the Pacific Ocean and the narrow Isthmus of Panama. Its area, 476,916 sq. m., is about the same as that of the four states, Utah, Colorado, Arizona and New Mexico. Its outline is very irregular and its boundaries adjoining Brazil, Peru and Ecuador are not definitely settled.

PHYSICAL CHARACTERISTICS. The surface of Colombia may be divided into two physically differing areas: the lowlands of the east and south, and the mountains of the center and west. The lowlands consist of broad treeless plains with or without vegetation, variously known as savannas or llanos, and the vast silvas, or forested tracts. The mountains are a part of the Andes system and consist chiefly of three ranges that meet in a lofty highland known as the Knot of Pasto. In the central part volcanoes, both active and extinct, are numerous, and many of the highest peaks in South America lie in this region. The Magdalena is the most important river of Colombia and is the fourth river of South America in size and importance. Others are the Cauca, the Atrato, the Putumayo and various tributaries of the Orinoco.

CLIMATE, RESOURCES AND INDUSTRIES. Colombia has tropical and temperate regions, according to the elevation. In the plains and lowlands it is frequently unbearably hot and unhealthy. The tablelands, however, have almost uninterrupted spring weather, and all of the products of a temperate zone grow in profusion. The products which are raised for export are tagua, India rubber, bamboo, vegetable ivory, tobacco, coffee, sugar, bananas, rice, wax palm, dyewoods, balsam, wheat, maize and the sarsaparilla-producing smilax. Panama hats, which are widely exported, are

made from the fiber of a native palm-like plant.

Aside from plant products, Colombia has great mineral wealth. Silver and gold are mined in many localities. Salt, coal, platinum, copper, mercury and some other metals are abundant enough to supply the local demand and are exported in small quantities.

GOVERNMENT AND HISTORY. Colombia is a republic whose executives are a president and vice-president, elected by Congress for a term of four years. The Congress consists of a Senate and a House of Representatives, also chosen for four years. Since 1908 the country has been divided into 24 departments, called circumscriptions and somewhat comparable to the states of the United States. The republic formerly belonged to Spain but secured its independence in 1819. It then included three sections, known as Venezuela, Ecuador and New Granada, and was officially called the Republic of Colombia. In 1832 the three states separated, but later united in a Confederation, which had only a brief existence, and in 1863 the United States of Colombia was formed in almost the same territory as occupied at present. The states forming the republic then had individual sovereignty, a condition which was abolished when the new constitution was formed in 1886. The national language of Colombia is Spanish and the prevailing religion is Roman Catholic. Bogota is the capital and the largest city. The population of Colombia is 6,300,000.

Colonel, Kur'nel, a military officer ranking next below a brigadier-general and above a lieutenant-colonel. As the regiment, which is a colonel's command, is the highest organization of the United States army in time of peace, so the colonel is the highest officer in active command in peace. A colonel may also have command of an important artillery district.

Colo'nial Dames of America, a patriotic society of women organized in New York City in 1891. The objects of the society are: (1) to collect and preserve manuscripts, relics, traditions and me-

mentos of the founding of the Thirteen Original States and of the heroes of the Revolutionary War; (2) to promote the celebration of great historic events; to disseminate information on all subjects pertaining to American history, particularly among the young; and to cultivate the spirit of patriotism and reverence for the founders of the American constitutional history. The society has chapters in many states and a large membership. The Colonial Dames of America is a distinct organization from the National Society of Colonial Dames of America, which is composed of 36 corporate societies and was founded as a memorial of the thirteen colonies. Membership is by invitation only.

Col'ony, a settlement made by voluntary emigration in a remote region under the control of the mother country. Any such settlement in which residence is not voluntary is a penal colony, the people of which are serving sentences for crimes committed in the parent country, and are under the jurisdiction of that country.

The United States has no penal colonies, but when the American Republic was involved with Spain in a war for humanity, which ended with the Philippines and Porto Rico in the former's possession, these dependencies were governed largely as the European nations control their colonies, until the inhabitants could be taught a measure of self-government. The various colonies held by the United States are Alaska, Guam, Hawaii, Porto Rico, the Philippines and Samoan Islands. Change in ownership of colonies results from wars, exchange of territory or from purchase.

Colorado, *Kol' o rah'do*, THE CENTENNIAL STATE, one of the Mountain States, is bounded on the n. by Wyoming and Nebraska, on the e. by Nebraska and Kansas, on the s. by Oklahoma and New Mexico and on the w. by Utah.

SIZE. The extreme length from east to west is 387 m., the breadth is 276 m. and the area is 103,948 sq. m., of which 290 sq. m. are water. Colorado is twice the size of North Carolina or Ohio,

about three times the size of Indiana and the seventh state in area.

POPULATION. In 1920 the population was 939,629. From 1910 to 1920 there was a gain in population of 140,605, or 17.6 per cent. There are 9.1 inhabitants to the square mile and the state's rank in population is 33.

SURFACE. The surface of Colorado has three natural divisions, each occupying about one-third of the area,—the eastern plains, the Rocky Mountain system in the center and the western plateaus.

The eastern part belongs to the Great Plains region and consists of rolling steppes and plains, nearly devoid of timber, except along the rivers, which are lined with cottonwoods and willows. Starting with an elevation from 3000 to 4000 ft. at the Kansas line, the country gradually rises toward the west until, at an elevation of about 6000 ft., it meets the foothills of the Rocky Mountains, which rise in sharp ridges called "hog-backs."

The middle third of the state is occupied by the Rocky Mountain system and contains a greater mountain mass than any other state in the Union. Several main ranges, separated by intervening valleys, traverse the state from north to south and attain here their greatest altitude. The most eastern chain of mountains is the Front Range (sometimes called Medicine Bow at the north), which extends from the Wyoming line to Pike's Peak. The famous Cripple Creek mining district is near its southern extremity. West of the Front Range is the Park Range, which enters the state at the Wyoming line and runs south to the Arkansas Hills, about 20 m. west of Cripple Creek; and, farther south, is continued by the Sangre de Cristo and Culebra ranges to the New Mexico line. About 16 m. west of the Park Range and parallel with it, is the Sawatch Range, extending from the Mount of the Holy Cross southward to Marshall Pass. Farther to the southwest, the San Juan Range runs in a southeasterly direction to the New Mexico line. Still west of

these main ranges are shorter ranges and broken mountain masses, including the Elkhead, Elk and West Elk groups; and, in the southwestern part of the state, the San Miguel Mountains, an outlying group of the San Juan.

The intervening valleys of the mountain ranges are often traversed by cross ranges, thereby enclosing areas of comparatively level land called parks. There are four of these main parks in the state and many smaller ones. The largest of the four is San Luis Park, in the southern part of the state. It lies between the Sangre de Cristo and Culebra ranges on the east and the Cochetopa Hills and San Juan Range on the west, has an altitude of about 7000 ft. and an area nearly equal to that of Massachusetts. North of San Luis Park is South Park, between the Park and Sawatch ranges, with an altitude of from 8000 to 10,000 ft. and an area about equal to that of Rhode Island. North of South Park is Middle Park, between the Front and Park ranges, having a slightly greater altitude and somewhat larger area. North Park, which is next to San Luis Park in size, lies between Medicine Bow and Park ranges. The western third of the state is, in its general character, a high plateau sloping gradually toward the Utah line and popularly known as the "Western Slope." It is generally broken by hills and bluffs and extensive valleys. The latter follow the westward flowing rivers and their innumerable tributaries which cut the country up transversely. The result is an exceedingly complex surface composed of plateaus, mesas, river valleys, bluffs and hills, with occasional higher mountain groups. Large sections are almost bare of vegetation or are covered only with sagebrush.

RIVERS. The main ranges of the Rocky Mountains form the continental divide, which takes a zigzag course through the middle of the state, now following one range and now another. This divide separates the streams flowing into the Atlantic from those flowing into the Pacific. West of the divide the rivers belong to the Colorado River system and

find their outlet in the Gulf of California. The most important streams belonging to the Colorado system are the Grand and the Gunnison, draining the central portion of the western part of the state; the White and the Yampa, draining the northern part; and the Dolores and the San Juan, draining the southwestern part. The Rio Grande rises in the south-central part of the state and flows directly southward. That part of the state belonging to the Mississippi system is divided between the Arkansas, which drains the southern portion, and the Platte, which drains the northern part of the eastern half of the state. Both of these streams rise west of the Front Range.

SCENERY. Colorado is said to contain more lofty mountain peaks than any other state in the Union. There are within its borders nearly 100 peaks having an altitude of 13,000 ft., 37 of these being over 14,000 ft. high. Mt. Massive and Mt. Elbert are the highest peaks in the state, each having an elevation of 14,402 ft., according to the latest measurements. Pike's Peak, 14,109 ft., is the most noted and most accessible mountain in Colorado. A good burro trail leads to its summit, which is also reached by a cog-wheel railroad, and also a wonderful automobile trail, and it is visited by thousands of tourists every season. Long's Peak (14,255 ft.), Evans Peak (14,260 ft.), Mt. Blanca, Castle Peak and the Mount of the Holy Cross are also celebrated mountains of the state. The Mount of the Holy Cross receives its name from a peculiar formation of valleys on its sides containing masses of snow which form a cross. The Garden of the Gods and Monument Park are widely known for their beauty.

In the mountain sections are also found many canyons and deep gorges of awe-inspiring grandeur. Famous among these are the Canyon of the Grand, the Black Canyon of the Gunnison and the Royal Gorge, the latter being the channel through which the Arkansas River cuts its way to the eastern plains (See **ROYAL GORGE**). In many of the canyons of the

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southwestern part of the state are remains of the dwellings of the ancient cliff dwellers, a mysterious race about which little is known. The United States Government is restoring some of the most interesting of these dwellings. The entire mountain region is noted for the wildness and grandeur of its scenery, and many of the most attractive spots are easily accessible by rail. Good automobile roads are also being constructed throughout the state at great expense. Almost every typical kind of scenery may be found in Colorado.

CLIMATE. The climate is dry, stimulating and remarkably healthful. The great parks are beneficial to those afflicted with tuberculosis and other lung diseases. During the summer the days may be hot, but the nights are cool and the summers are as a whole very pleasant. Notwithstanding the altitude the winters are not severe and zero weather is not often experienced except in altitudes above 7000 ft. Among the mountains the snowfall is heavy. Elsewhere it is light and the snow soon melts. The mean temperature for January is 28.5° and for July from 72° to 74°. The average rainfall is about 15 inches and is heaviest in the mountain sections.

MINERALS AND MINING. Colorado contains a great variety of minerals and the mineral resources of the state are practically inexhaustible. It is the sixth state in the value of its mineral products, and mining, next to agriculture, constitutes the chief industry. (The value of agricultural products exceeds that of mines, but the commerce produced by the former exceeds that by agricultural products.) The annual output of gold is about \$25,000,000 making Colorado the leading state in the production of this metal. Cripple Creek, Leadville and the San Juan country are the chief metal-mining areas, and the mines in these localities are among the best in the world. The smelters are located at Denver, Colorado City, Pueblo, Salida, Golden, etc.

Extensive fields of coal, ranging from lignite to the best varieties of bituminous and anthracite are distributed through-

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out the state, but the largest deposits are in the northwestern part. The most extensive mines, however, are located in the Trinidad field. The output is about 12,000,000 tons a year, making Colorado the leading coal-producing state west of the Mississippi River. Petroleum occurs in Fremont and Boulder counties and asphalt is found in the northern part of Middle Park and in Garfield, Rio Blanco and Routt counties. The supply of granite and other building stone is unlimited, and precious stones of various sorts have been found in paying quantities, the most valuable being near Cañon City in the vicinity of the Royal Gorge.

FORESTS AND LUMBER. Valuable forests containing pine and other soft woods occur throughout the mountain sections, and lumbering is an industry of considerable importance.

AGRICULTURE. The state is largely dependent upon irrigation and the area of irrigated lands is rapidly extending. The completion of the Uncompahgre Project has opened a large territory not before available (See IRRIGATION). Agriculture is rapidly increasing in extent and value of its products, and is now the leading industry of the state. The soil is invariably fertile and produces abundant crops wherever sufficient water can be procured. In many sections dry-farming is successful (See DRY-FARMING). Alfalfa, wheat, oats, barley, corn, potatoes and sugar beets are the most valuable field crops. In the Arkansas Valley cantaloupes of excellent quality are raised in large quantities, and garden vegetables for local markets bring a large income to farmers living near cities or mines. In the mountain valleys apples, peaches, pears and other fruits of the temperate regions are raised in great abundance and of superior quality, and fruit growing is a profitable industry. Many localities have native grass, which is excellent for stock, and large numbers of high-grade cattle and horses are raised. Dairying is a valuable industry and is rapidly growing.

MANUFACTURES. The most extensive manufacturing industries are associated with smelting ore and refining metals.

Iron and steel manufactures are also important. Repairing and making machinery and tools, repairing railroad cars and locomotives, making flour and gristmill products and the manufacture of beet sugar are other thriving industries. Colorado is one of the leading manufacturing states west of the Mississippi, and the annual output of her manufactured products amounts to over \$103,000,000.

TRANSPORTATION AND COMMERCE. Notwithstanding its mountains Colorado has over 5000 m. of railway. A number of trunk lines extend through the mountains, reaching also the cultivated valleys and mining districts. In some places narrow-gauge lines extend through parts of the mountain region where the grades and traffic would not warrant the construction of standard lines. The most important systems are the Union Pacific, the Missouri Pacific, the Santa Fe, the Denver & Rio Grande, the Colorado & Southern, the Rock Island, the Colorado Midland, the Denver, Northwestern & Pacific and the Burlington. Denver is the chief railroad center and from it lines radiate in all directions. In Denver and other cities there are excellent lines of street railway.

Colorado has a large commerce. Gold, silver, lead and other metals are sent to Eastern markets in large quantities. Live stock, fruit and other agricultural produce are also exported. Manufactured goods and foodstuffs are imported. Denver is the chief commercial center.

GOVERNMENT. The constitution was adopted in 1876. Several important amendments have been added. One of these, adopted in 1893, confers the right of suffrage upon women and also gives them the full right to hold office. Another provides for amendments by petition. The executive department consists of the governor, lieutenant-governor, secretary of state, treasurer, auditor, attorney-general and superintendent of public instruction. Each of these officers is elected for two years. The Legislature consists of a Senate and House of Representatives, the total membership of which cannot exceed 100. Senators are

elected for four years and representatives for two.

The judicial department comprises a Supreme Court, District Courts and County Courts, justice courts and such other courts as may be established by law. Counties and municipalities administer local government.

The state has recently adopted the initiative and referendum, the recall of judges and of judicial decisions, and the people are alive to the governmental questions of the day.

EDUCATION. Colorado maintains an excellent system of public schools which are under the general direction of a state superintendent of public instruction. The schools of each county are under the supervision of a county superintendent. "The State Normal School of Colorado" is located at Gunnison, and "The State Teachers College of Colorado" at Greeley. The state university is at Boulder, the agricultural college at Fort Collins and the school of mines and industrial school at Golden. There are a number of denominational schools of high grade throughout the state.

STATE INSTITUTIONS. The hospital for the insane is at Pueblo, the soldiers' and sailors' home is at Monte Vista and the school for the deaf and blind is at Colorado Springs. The state prison is at Cañon City and there is a state reformatory at Buena Vista.

CITIES. The chief cities are Denver, the capital; Pueblo, Colorado Springs, Trinidad, Boulder, Greeley, Fort Collins, Leadville, Cripple Creek and Grand Junction.

HISTORY. Colorado was named after the river of that name, the Spanish adjective *red*. The country was visited, but not settled, by Spanish adventurers of the 16th century. Colorado territory was gained by the United States through the Louisiana Purchase, 1803, and through the Treaty of Guadalupe Hidalgo in 1848. Pike explored it in 1806; Long, in 1820; Fremont, in 1842 and 1843; and Gunnison in 1853. The discovery of gold in 1858 led to the settlement at Denver

and at Boulder. In 1861; from parts of Kansas, Nebraska, New Mexico and Utah, Colorado Territory was organized. It entered the Union as the *Centennial State* in 1876. Women were given the franchise in 1893. A \$3,500,000 capitol building was finished in 1894. Since 1900 the state has developed rapidly along all lines of industry.

ITEMS OF INTEREST. The state flower is the Columbine. The state tree is the blue spruce. In 1916 Colorado produced one-third of the beet sugar made in the United States. The first year of prohibition in Colorado showed a marked increase in the prosperity of the state.

The prisoners in the penitentiary are paid for their work, one half going to the man's wife or children while the remainder becomes his at his discharge.

Colorado, Grand Canyon of the, a stupendous gorge in the northwestern part of Arizona in the Kaibab plateau region of the Colorado River. This river, named by the Spaniards the Colorado, or Red, is unlike any other great river in the world in the fact that no commerce can be carried upon its turbulent waters. Its upper branches are the Green and the Grand rivers. For more than 1000 m. along its course the Colorado has cut for itself a series of canyons, the most wonderful of all being the Grand Canyon. This canyon begins at the mouth of the Colorado Chiquito, or Little Colorado, and terminates at the Grand Wash Cliffs, a distance of 217 m. This canyon is not a deep, gloomy gorge, but is in reality a series of canyons, one within and below the other. From the southern rim it is 12 m. across to the opposite walls, and the beholder can see a distance up and down for about 30 m. The river at this point is a turbid torrent 6000 to 7000 ft. below. The titanic walls are set on every side with cliffs, buttes, towers, caves, handsomely storm-carved and painted in an endless variety of colors. The canyon is very tortuous and of almost uniform splendor. A national reserve, 60 by 60 m., covers the greater part of its magnificence. The great plateau to the south of the canyon

is largely covered with a gigantic forest, though in some portions there are treeless valleys and volcanic mountains. The Uinkaret Mountains are purely volcanic, and it is not improbable that the San Francisco Mountains, also volcanic, were once an area of great depression in this plateau region. Across the Grand Canyon and plateaus over 15 faults of remarkable magnitude are found to exist, and the displacements vary from about 600 to 7000 ft. To the geologist this region presents a fascinating field. Charles Dudley Warner says: "It is only within a quarter of a century that the Grand Canyon has been known to the civilized world. It is scarcely known now. It is a world largely unexplored. Those who best know it are most sensitive to its awe and splendor."

There are but three points from which an easy descent may be made of the south wall of the Grand Canyon in the vicinity of the granite gorge, the Grand View, Bright Angel and Bass, or Mystic Spring, trails. There is also a Moki Indian trail by way of Little Colorado Canyon on the west. The Atchison, Topeka & Santa Fe Railroad is the only means of directly reaching the Grand Canyon, a branch railroad, called the Grand Canyon Railroad, having been built from Williams, a town of about 2000 inhabitants, 64 m. distant. A costly resort hotel, named El Tovar, has been built by the Santa Fe not far from the head of Bright Angel trail, and is named after Don Pedro Tovar, a Spanish explorer, whose name is linked with the discovery of the Grand Canyon by Coronado in 1540. Here also live a small band of Hopis, who are, without exception, the most primitive Indians in the country. Their ceremonies are hundreds of years old. Consult *An Overland Trip to the Grand Canyon*, J. W. Powell; *The Physical Geology of the Grand Canyon District*, C. E. Dutton; and *In and Around the Grand Canyon*, George Wharton James.

Colorado River, a great river of southwestern United States formed by the junction of the Green River of Wyo-

ming and the Grand River of Utah. It flows south across Utah and Arizona through cañons of unsurpassed grandeur, forms for a distance the boundary between Arizona and California and finally crosses a narrow strip of Mexico to reach the Gulf of California. The river is 1,050 m. in length, and its great gorges, cascades and whirlpools make it one of the great attractions of the west. See COLORADO, GRAND CANYON OF THE.

Colorado Springs, Colo., a city and the county seat of El Paso Co., 75 m. s. of Denver, on the Denver & Rio Grande, the Atchison, Topeka & Santa Fe, the Colorado & Southern, and the Chicago, Rock Island & Pacific railroads. The city is superbly located on a broad plateau close to Pike's Peak, "the sentinel of the Rocky Mountains," and is famous as a health and pleasure resort. Its most distinctive development has been as a residential city on account of the climate, mineral springs and remarkable scenic attractions. Manitou and other famous resorts are near by, and in the neighborhood are the Cave of the Winds, Williams Cañon, Seven Falls, Garden of the Gods, Crystal Park, Mt. Manitou, South and North Cheyenne Cañons, Ute Pass, Phantom Cliff Cañon, Pike's Peak Summit and other picturesque places. There is a modern street-railway system. The central location of Colorado Springs gives it command of all mountain routes and driveways. A scenic boulevard winds in and out to Cañon City, connecting with the picturesque Sky-line Drive and the road to the top of the Royal Gorge. Splendid automobile roads also reach out to Denver, Cripple Creek, Pueblo, up Ute Pass via the Pike's Peak Ocean to Ocean transcontinental highway, over the divide and to points throughout the state.

Colorado Springs possesses a unique park system comprising 3,000 acres. Besides the Garden of the Gods, North Cheyenne Cañon, Palmer Park and Monument Valley Park, it includes many miles of mountain drives and trails. The Colorado Springs Golf Club is northeast of the city. The Pike's Peak region is

well equipped with hotels ranging from the finest to the simplest. The leading educational institution is Colorado College, coeducational and nonsectarian. There is an excellent public school system and fine public buildings. The state institution for the blind, deaf and mute is located here, as are also the Union Printers' Home and the National Sanatorium of the Modern Woodmen of America. There are a number of sanatoriums, several hospitals and church edifices of all denominations. Colorado Springs was founded by General William J. Palmer, soldier and railroad builder, in 1871, and the town was incorporated a year later. A city charter was granted in 1878. The development of the Cripple Creek gold mines about 50 m. distant, on the opposite side of Pike's Peak, with a production of \$300,000,000 since 1891, aided the rapid growth of the city. Population in 1920, United States Census, 30,105.

Colorado, University of, at Boulder (1876). This university was incorporated by the Territorial Legislature. Its plant now includes about 20 buildings. It comprises a collegiate department, a school of medicine organized in 1883, a law school established in 1892, a school of applied science established in 1893 and a department of university extension organized in 1912. It also maintains a graduate school, which confers the degrees of M. A. and Ph. D. Its library numbers about ninety thousand volumes. The enrollment is about one thousand five hundred.

Color Blindness. See COLOR, THEORY OF.

Color Printing. See PRINTING, subhead, *Color Printing*; HALF TONE.

Color, Theory of, the effect of light, that is, ether waves, of different wavelengths upon the retina of the eye. The waves of greatest wave-length and lowest frequency of vibration visible to the eye are those which produce the effect of red, while those of shortest wave-length and greatest vibration-frequency produce violet. Waves of slower vibration than red waves do not affect the eye, but are

perceived by the feeling and produce heat; those of more rapid vibration than violet are called actinic waves and produce chemical effects. But all three kinds produce more or less heat in the body on which they fall. As commonly used, the word *color* refers to the appearance of an object caused by the light waves which it reflects, and an object which we say is green appears so because it absorbs, more or less, all other light waves and reflects to the eye chiefly the green waves. In considering color from a scientific standpoint we must for the time forget the common use of the term in connection with pigments.

SPECTRUM. Colors. If a ray of white light is passed through a prism and allowed to shine upon a white screen, it is seen to be divided or dispersed into what are often called the seven primary spectral colors, or the spectrum; named in order these are violet, indigo, blue, green, yellow, orange and red. Their order may be remembered by means of the word *vibgyor*, formed from the initial letters taken in order. If, on the other hand, rays of these seven colors in suitable proportion are allowed to fall upon one spot on the screen the combination produces a white light. A white object, then, is one which reflects all waves of light equally well. Theoretically, a black object is one which reflects no waves but absorbs them all; practically, however, there is no such object and those which we say are black do reflect some light waves. By making different combinations of these light rays thousands of different colors are formed, and any of these not shown by the spectrum are called secondary colors; such are brown, purple, etc. When two rays of different colors together form a white light, those colors are said to be complementary; red and green, blue and yellow are examples of complementary colors, since these rays may be combined to produce white light. Mixing the corresponding pigments, however, does not produce a white paint, since two pigments combine by adding their absorptions and not by adding the colors they would separately reflect. In

the Young-Helmholtz theory of color discussed below, red, green and blue are called the primary colors because from their rays all other colors may be formed; in pigments, red, yellow and blue are the primary colors.

All colors have three qualities, known as hue, luminosity and saturation. Hue refers to the quality whereby a green-yellow differs from a red; luminosity refers to the brightness of a color, yellow being far brighter than either red or violet; and saturation refers to the purity. If a color is of such purity that it is free from white, it is said to be saturated. Primary colors combined with white are called tints; with black, shades.

COLOR VISION. At the present time there are two slightly differing theories of color vision: the Young-Helmholtz theory, most generally accepted, and the Hering theory. The first assumes that the ends of the nerves in the eye are of three sorts, which, when stimulated, cause respectively the sensations of red, green and blue. When the three sets are stimulated equally, the effect is the impression, white; other colors are due to the stimulation of one of the nerve ends or to a combination of two or of the three. Since no light of just one wave-length can stimulate one nerve alone, no color is fully saturated. In color blindness, this theory holds that one of the color nerves is lacking. The failure of this theory to account for brightness or feebleness of visual impressions is its chief insufficiency. The Hering theory assumes that the three sets of nerves in the eye respond respectively to sensations of red and green, yellow and blue, and lastly and by far the most plentifully, white and black.

TEST FOR COLOR BLINDNESS. A test commonly employed to determine if a person is color blind or if he has normal judgment of colors is known as the Holmgren test, from the name of its inventor. Three skeins of worsted yarn, a pale green, a brilliant red and a magenta not very near saturation, are used as the confusion samples. The person is given a collection of skeins of various colors,

red, green, blue, yellow, purple and brown, in various degrees of saturation, and several skeins of neutral tint, such as grays. One at a time a confusion sample is placed before him, and he is asked to select all those colors that match this confusion sample. To a "red-blind" person, the magenta confusion sample appears blue, since he cannot see the red of the magenta, and he will accordingly place the blue and purple skeins with it. He will also place the browns with gray. A "green-blind" person will place the gray skeins with the pale green confusion sample. Both red-blind and green-blind persons are inclined to put both brilliant green as well as brilliant red skeins with the red confusion sample.

The color of an object or pigment depends, as has been said, upon the waves of light which it reflects. The other waves may be absorbed and changed to heat or may pass through the object. Thus gold leaf appears yellow by reflected light and green by transmitted light. The waves which may be reflected depend upon the nature of the body and the quality of the light in which it is seen. For example, two silks matched by gaslight may not be a match by daylight. See LIGHT.

Col'osse'um, a Roman amphitheater begun by Vespasian and finished by Titus in 80 A. D. It was called the Colosseum because it was the largest amphitheater, being 612 ft. long, 515 ft. wide and 160 ft. high, and having a seating capacity of 80,000 spectators. On the exterior it had three rows of columns, Doric, Ionic and Corinthian, and above these rose a row of Corinthian pilasters. There were windows between the alternate pilasters, and the arches between the columns formed open galleries through the building. Within were three tiers of seats corresponding to the three outer stories. The two first stories, consisting of 24 and 16 rows of seats alternately, were separated by a high wall from the third row, where the common people sat. In a gallery surrounding the arena, the open space in the center, sat the emperor, the senators and the Vestal Virgins. Underneath the

arena were dens for the wild animals. During the Middle Ages the Colosseum was used as a quarry for marble and other building material, but Pope Benedict XIV (1740-1758) saved it from complete demolition.

Colossians, *Ko losh' i ans*, Epistle to the. See PAULINE EPISTLES.

Colts'foot", a European herb of the Composite Family now growing wild in this country. It grows in clayey soil, in low, wet places throughout the Northern and Middle states. In March or April it sends up a few leafless stems, upon each of which is a single head of tiny, yellow blossoms surrounded by a row of narrow, yellow or purple-tinted rays. The leaves do not appear until after the flowers have withered and are often not recognized as belonging to the early-appearing blossoms. These leaves all grow from the summit of the root and are five to eight inches long and three to six inches broad; they are somewhat bluntly-lobed and are downy underneath. Colts-foot was brought to the United States as a cough cure and is still used in pulmonary diseases. The wild ginger of the Birthwort Family is often falsely called coltsfoot, and the beetleweed of the mountain woods of the South, an herb of the Heath Family, is locally known by the same name.

Colum'bia, Mo., a city and the county seat of Boone Co., about 145 m. n.w. of St. Louis. Transportation is furnished by a branch connecting with the Wabash and the Missouri, Kansas & Texas railroads. The chief industries are farming, fruit growing and stock raising. There are in the town packing plants, grain elevators, flour and planing mills, brickworks, a shoe factory and manufactories of farm implements. Columbia is chiefly distinguished as an educational center, being the seat of the University of Missouri, a coeducational institution founded in 1839 (See MISSOURI, UNIVERSITY OF). Other institutions of learning are Christian College (Disciples), founded in 1851; the Bible College of the Disciples of Christ in Missouri; Stephens College (Baptist), established in 1856; and the

Rosenthal School of Commerce. The library of the Missouri State Historical Society is housed in one of the buildings of the university, and on the university campus stands the monument to Thomas Jefferson, presented to the university by the descendants of the President, when Congress appropriated money for the monument now standing over his grave at Monticello, Va. A United States weather station is located at Columbia. Parker Memorial and Boone County hospitals are prominent features of the city. Columbia was settled about 1821. Population in 1920, U. S. Census, 10,392.

Columbia, Pa., a city of Lancaster Co., 28 m. n.e. of Harrisburg and 81 m. w. of Philadelphia, on the east bank of the Susquehanna River, here more than a mile wide, and on the Pennsylvania and the Philadelphia & Reading railroads. Wrightsville on the west bank of the river is connected with Columbia by one of the longest bridges in the United States. The town is surrounded by beautiful scenery and was founded in 1726 by English Quakers from Chester County and named Wright's Ferry. In 1789 it was proposed to locate the capital of the United States here. The original bridge across the Susquehanna was burned in June, 1863, to prevent the Confederate troops from marching on Philadelphia. Columbia is an important trade center and shipping point and contains important rolling mills and manufactories of machinery, engines, flour, stoves, lumber, laundry machines, silk, laces and other articles. Population in 1920, 10,836.

Columbia, S. C., a city, county seat of Richland Co. and capital of the state, 153 m. n. of Savannah and 129 m. n.w. of Charleston, on the east bank of the Congaree River and on the Southern, the Atlantic Coast Line, the Seaboard Air Line, the Columbia, Newberry & Laurens and other railroads. The Congaree River is navigable from Columbia to the coast. The city is situated a short distance below the junction of the Broad and Saluda rivers, and the surrounding country is well adapted to cotton culture. By means of a canal abundant water power is fur-

nished from the Congaree. There is a fine street-railway system. The city has important commercial interests and is a great distributing point for South Carolina.

PARKS AND BOULEVARDS. Columbia is attractively situated on a bluff overlooking the Congaree River. The streets are wide and well paved, and there are a number of handsome residential districts. Spacious grounds surround the capitol, and several monuments are scattered about the city, including a palmetto tree in bronze.

PUBLIC BUILDINGS. The most noteworthy building is the state house, or capitol, built of granite and modeled after the National Capitol in Washington. The building is one of the most imposing in the South and cost \$4,000,000. Other public buildings include the city hall, Federal Building, a courthouse, railroad station, many new business houses, ten stories in height, a public library, several theaters and a number of handsome churches.

INSTITUTIONS. Columbia is an important educational center, and the city is the seat of the University of South Carolina. Other educational institutions include the Columbia College for Women (Methodist), the College for Women (Presbyterian), the Presbyterian Theological Seminary, the Allen University (African Methodist) and Benedict College for negroes. There are excellent graded schools and several high schools. There are a number of sanitariums, and the state penitentiary and a state insane hospital are located here.

INDUSTRIES. Columbia contains some of the largest cotton mills in the world, the manufacture of cotton goods being the chief industry. There are also extensive foundries and machine shops, glass factories, hosiery mills, granite quarries, lumber and planing mills and fertilizer works. Vast beds of kaolin, which is used in the manufacture of pottery, abound in the vicinity.

HISTORY. In 1786 the people of South Carolina demanded a capital more centrally located than Charleston, and the

State Legislature platted the village of Columbia for this purpose. In 1790 the Legislature first met here and in 1854 a city charter was granted. On Feb. 17, 1865, Gen. William T. Sherman entered the city in his march through the Carolinas. The following night a fire broke out which laid about half of Columbia in ashes, but after the close of the Civil War the city grew rapidly. Population in 1920, U. S. Census, 37,524.

Columbia River, or Oregon River, a large western river rising in Upper Columbia Lake on the western slopes of the Rocky Mountains in British Columbia. At first it flows northwest, but later turns south and flows through the Arrow Lakes to the boundary of Washington, where it is joined by Clark's River. Through Washington it follows a tortuous course, mainly southward, and after receiving the Lewis, Shoshone, or Snake, River, its largest tributary, it forms for some distance the boundary between Oregon and Washington. Flowing westward it finally reaches the Pacific in northern Oregon by means of an estuary, 35 m. in length. Where it passes through the Cascade Mountains, it forms a series of falls up to which the tide rises. The scenery along the Columbia is of exceptional beauty and majesty, and the river is besides of great importance for its salmon fisheries. Its length is 1400 m. An area of no less than 260,000 sq. m. is drained by this river.

Columbia University, at New York (1754). One of the most cosmopolitan of American institutions of learning throughout all its history, this is also one of the oldest and one of the greatest. It was chartered by George II as King's College and opened in 1754. Thirty years later, by act of the Legislature, it became Columbia College; and in 1912 took its present name. Under presidents Frederick A. P. Barnard, Seth Low and Nicholas Murray Butler it has shared in the growth and prosperity of the city; by 1918 its assets had increased to approximately \$50,000,000. Though not a strictly coeducational institution, provision is made for women in Barnard College,

Teachers' College and in the graduate schools. It has no divinity school; but includes Columbia College (for men), Barnard College, Teachers' College, the School of Law, of Mines, Engineering and Chemistry, Architecture, Business, Journalism and Dentistry; College of Physicians and Surgeons, and of Pharmacy; and the Graduate Faculties of Political Science, Philosophy and Pure Science. It also offers courses in the fine arts and maintains a Summer School largely attended, especially by teachers, who come from every section of the country. In University Extension it offers to men and women who can give only a part of their time to study an opportunity to pursue subjects included in a liberal education and to take courses toward a diploma or an academic degree. The university occupies a splendid location on Morningside Heights, has many magnificent buildings, a library of about 800,000 volumes and a full and modern equipment in all departments of instruction. Including the Summer Session and the Extension Courses it enrolls more than 32,000 students.

Col'umbine, Wild, an odd-shaped flower of the Crowfoot, or Buttercup, Family. The stems are erect and leafy, the leaves being much cut, thin and of a delicate green color. The flower is made up of fine narrow, bright red, leaflike coverings, called sepals, which curve inward, and between which hang five red, trumpet-shaped tubes, which are the petals. The petals are yellow inside and are very attractive to insects, both for their color and for the honey which they contain. Rarely, purple and blue specimens of the wild columbine are found. It flowers from April till July. This plant is so widespread in the United States that it was among those suggested as the national flower. The blue wild columbine has since been chosen the state flower of Colorado. A larger specimen, of pale purple flowers that may or may not be double, is found in cultivation.

Colum'bus, Christopher (Italian, Cristoforo Colombo; Spanish, Cristóbal Colon) (1436 or 1446-1506), the dis-

coverer of America, born at or near Genoa, Italy. He was the eldest son of Domenico Colombo, a wool comber of energy and some small means, and received a good education for his day, perhaps at the University of Pavia, in Latin, geography, astronomy and mathematics, and developed into an expert draughtsman. Becoming a sailor at the age of 14, in his voyages during the next 25 years he went to and fro upon the Mediterranean, engaged in scrimmages with Mussulman pirates, sailed down the coast



WILD COLUMBINE

of Africa as far as Guinea, and went north as far as England and Iceland.

In the earlier intervals between his voyages he seems to have worked at his father's trade in Genoa; but later to have engaged in the more congenial occupation of making charts and maps, in which he became noted for his skill. In 1470, or shortly thereafter, he removed to Lisbon, Portugal, which had become the

center of navigation interests through the labors of Prince Henry the Navigator. Here, in connection with his younger brother Bartholomew, he continued to make charts and maps when not away on his voyages.

GEOGRAPHICAL CONDITIONS. To understand the further life and explorations of Columbus it is necessary to forget our modern map and to see the world through the eyes of his contemporaries. Knowledge of the earth's surface was largely limited to the Mediterranean and its adjacent countries and to the rich regions of Asia which were reached by means of caravans across the desert from the eastern end of that sea. There was also some knowledge of the Atlantic Ocean near the coasts of northern Africa and Europe. When, with the capture of Constantinople in 1453, the Turks obtained control of the regions east of the Mediterranean, the way was closed to the growing commerce with the rich East, and some other route must be found if possible. Attention was turned to an ocean passage around Africa.

But this was an unknown region. One ancient view, that of Ptolemy, dating from the second century, held that Africa and Asia were connected at the far south, making the Indian Ocean a landlocked sea. Another view was that of Mela, dating from the first century, which held that the Atlantic and Indian oceans were joined by an open sea south of Africa. But no one knew how far south Africa extended, and there was a persistent theory that at the equator existed a fiery zone so hot that it could not be crossed, since life there was impossible. Gradually, however, in spite of fears and dangers, adventurous spirits pushed farther and farther down the coast of Africa, until in 1471 the equator was crossed; but still the continent reached onward into the unknown distance.

DISCOVERY OF AMERICA. It was while these efforts were being made to find an eastern passage to India around Africa that Columbus turned his attention to a western route to the rich land of spices across the dreaded "sea of darkness."

His merit did not consist in the conviction that the earth was round, for this view had been held by educated men for a thousand years; but in the determination to put his belief to the test by sailing to the west in order to reach the east. Full of the zeal born of conviction, he sought eagerly for aid to make the trip possible; for about ten years he directed his efforts toward enlisting King John II of Portugal, and in 1484 turned to Spain to lay his scheme before Ferdinand and Isabella of Aragon and Castile. Finally, after eight years more of weary endeavor, when he was starting for France in search of aid there, his enterprise was adopted by Queen Isabella in behalf of Castile and funds were provided, some say by pledging her jewels. It was agreed that Columbus should have the title of admiral and be viceroy and governor-general in all lands which he should discover, and that he should be entitled to one-tenth of all the profits of commerce from such countries.

First Voyage. On Friday, Aug. 3, 1492, the little fleet of three vessels, with a crew of 90 men, set sail from the harbor of Palos upon the untried journey. The largest boat, the *Santa Maria*, was a decked vessel 90 feet long and was the flagship. The other vessels, the *Pinta* and *Nina*, were smaller and were undecked amidships. The plan was to sail due west after reaching the 28th parallel, as it was thought that this would strike the northern end of Japan. Accordingly Columbus proceeded southward to the Canaries, and then, turning westward, he left behind on Sept. 8 the last familiar landmarks and steered away into the vast unknown sea, while the sailors lamented with tears their unhappy fate; for the 15th century, with superstitious fancy, pictured the unexplored regions of the earth as inhabited by gorgons and hydras and deadly monsters of every kind.

The little ships were delayed in the region of windless calms, they passed through the tangles of the Sargasso Sea, they were carried onward before the trade winds until the men were seized with the terrible fear that they would

never be able to make their way back over those awesome wastes. Disastrous mutiny threatened which it required all the authority and influence of the Admiral to avert, when at last, after a voyage of 2800 miles from the Canaries, land was sighted at two o'clock in the morning of Friday, Oct. 12. The next day Columbus and most of his crew went ashore with gratitude and wild rejoicing, to the boundless astonishment of the frightened natives.

Columbus had landed on a small island of the Bahamas, to which he gave the name San Salvador, and which he supposed to belong to an outlying group near Japan. His movements from now on were due to the effort to locate Japan and the mainland of Asia, where were to be found the great cities of China. It is easy to imagine his bewilderment during the coming days as he found nothing but wild forests peopled with savages. He cruised about among the islands until he finally reached Cuba, which he gathered from the natives was the mainland of Asia. He therefore turned eastward in search of Japan, and was confident that he had discovered it when he came to Haiti, which he named Hispaniola, or "Spanish Land."

Here on Christmas morning he suffered the great loss of the *Santa Maria* by shipwreck. The *Pinta* meanwhile had deserted and its whereabouts were unknown. Building a blockhouse out of the remains of the *Santa Maria* and leaving 40 men who volunteered to remain behind, he sailed away for Spain on Jan. 4, 1493, on the little *Nina*, to report his discoveries and bring back reinforcements. The *Pinta* was picked up on the way, and the two small boats, after a stormy voyage and brief stops at the Azores and at Lisbon, reached Palos on March 15. Their arrival was hailed with rejoicing and Columbus was showered with triumphal honors.

Second and Third Voyages. The great explorer made three other voyages to the lands he had discovered. Now he found plenty of men eager and anxious to go. He started on the second voyage

from Cadiz, on Sept. 25, 1493, with 17 vessels and 1500 people. On board were also abundant stores, together with horses, mules, and cattle, for it was planned to establish a permanent colony at Hispaniola. Touching at the Canary Islands, which they left on Oct. 7, the ships had a pleasant voyage, and sighted land on Nov. 3. After cruising about among the islands in Caribbean waters for two weeks they arrived at Hispaniola, only to find the blockhouse in ruins and the men all massacred. Columbus founded a new settlement, called Isabella, spent two years in further explorations in the hope of finding Japan and China, and then returned to Spain, which he reached June 11, 1496. Things had not gone smoothly at the new settlement and malcontents had returned to stir up enmity against Columbus at home. Nevertheless he was cordially received at court and a new expedition promised.

This was not ready, however, for nearly two years, when Columbus started on his new voyage with six vessels on May 30, 1498. This time he took a more southerly route which brought him to the shores of South America near the mouth of the Orinoco River, July 31. After following the coast for some distance, the ships sailed northward to the southern shores of Hispaniola, where he arrived at San Domingo, which had now become the principal town of the island. Here he found everything in turbulent disorder, and was unable to restore harmony. Hostile emissaries were sent to Spain, with the result that a royal governor named Bobadilla was sent out to supersede Columbus, who, with his two brothers, Bartholomew and Diego, were sent back to Spain in irons. The appearance of the great discoverer in chains caused such a popular cry of indignation in Spain that the action of Bobadilla was disclaimed by the court and Columbus was immediately released and shown every mark of favor.

LAST VOYAGE AND DEATH. He was not restored to his position as governor-general; but was given a fleet of four vessels, with which he continued his dis-

coveries. With these he set sail on his fourth and last voyage on the 11th of May, 1502. After stopping at San Domingo, where he was refused the privilege of landing, he proceeded westward and cruised along the coast of Central America, still in search of China or an open passage to India. After an unsuccessful attempt to establish a colony, the vessels were wrecked on the coast of Jamaica, where Columbus waited in sickness for a year after sending messengers for help before he was rescued by the indifferent governor of San Domingo. He finally reached Spain on Nov. 7, 1504. Proceeding to Seville, he here, in the intervals of pain, attempted to get his affairs in order and secure the restoration of his rights. Thence he retired to Valladolid, where he died in disappointment and comparative poverty on May 20, 1506.

His remains were buried at Valladolid, but were removed to the monastery at Seville in 1513. In 1542 they were taken across the sea to the Cathedral of San Domingo in Hispaniola, and upon the cession of that island to the French in 1796 they were removed to Havana; whence, after the loss of Cuba in the Spanish-American War, they were finally taken back to the Cathedral of Seville, where they now repose.

CHARACTERISTICS. In personal appearance Columbus was tall and stately, of noble and commanding presence, with a fair, ruddy complexion and keen, blue-gray eyes. His manners were courteous, his conversation delightful, and "out of those kindling eyes looked a grand and poetic soul, touched with that divine spark of religious enthusiasm which marks true genius." He was a man of wide vision, dauntless courage, unshaken purpose and the ability to carry out a great enterprise in the face of overwhelming obstacles. Thinking that he had discovered a new route to the wealth of Asia, he died without knowing that he had changed the map of the earth and the course of history. In his own day he was denied the material rewards of his great achievement in opening new

paths across the sea, but his imperishable fame is forever linked with the New World which he discovered, where his name has become a household word in every home.

Columbus, Ga., a city and county seat of Muscogee Co., about 100 m. s.w. of Atlanta, on the Chattahoochee River and on the Central of Georgia, the Southern, the Seaboard Air Line and other railroads. Steamboat connection is maintained with the Gulf of Mexico connecting at Apalachicola, Fla., with Gulf steamers for New Orleans, Mobile and other ports. The city is one of the most important manufacturing centers of the South, with an abundance of water power, the river having a fall of 115 ft. within one mile, near the city. Throughout the neighboring region cotton is extensively cultivated; the city receives upward of 175,000 to 225,000 bales a year. About one-third of this is used locally in the mills. Because of its vast milling interests the city has come to be called "the Lowell of the South." In addition to the large and numerous cotton-goods factories in and near the city, there are in connection with other branches of the cotton industry, cotton compresses, cottonseed-oil mills and the largest cotton gins in the South. Next in importance is the iron industry. The plow works here are the largest in the South, and in the foundries, machine shops and ironworks are manufactured various agricultural implements, engines, boilers, ice machines, cotton screws and compresses. Another important industry is that of sugar refining and the manufacturing of sirup from sugar cane, the plant for this being the largest in the South. Among the other manufacturing establishments are a wagon factory, a barrel factory, flour mills and gristmills and show-case works. There are ten fertilizer plants. The commercial activities of the city are on a par with the manufacturing interests.

Columbus is a city of broad streets and numerous fine buildings. There are 100 acres of street parks and squares. Two railway and two public bridges connect

the city with Girard and other Alabama suburbs. The principal structures are the railway station, the Masonic Temple, Federal Building, the Odd Fellows' Building and a beautiful Y. M. C. A. Building. The school system is excellent. Columbus was one of the first cities of the United States to introduce manual training in its public schools. Also noteworthy is the admirable system for improving the condition of factory operatives, with its modern villages with good schools, libraries, proper amusements and other elevating influences. Columbus was laid out in 1828. The city was a source of supplies for the Confederate army during the Civil War, and here was fought the last battle of that war east of the Mississippi, on Apr. 16, 1865. Population in 1920, U. S. Census, 31,125.

Columbus, Ind., a city and county seat of Bartholomew Co., 41 m. s.e. of Indianapolis, on the East Branch of the White River at the mouth of Flat Rock Creek, and on the Cleveland, Cincinnati, Chicago & St. Louis, the Pittsburgh, Cincinnati, Chicago & St. Louis and other railroads. It is situated in an agricultural region and has extensive manufactories of furniture, agricultural implements, starch, tanned leather, threshing and saw-mill machinery, tools, cereals, pulleys and machine-shop products. Columbus was settled in 1821 and chartered as a city in 1864. Population in 1920, 8,990.

Columbus, Miss., a city and the county seat of Lowndes Co., 150 m. n.e. of Jackson and 95 m. w. of Birmingham, Ala., on the Tombigbee River and on the Southern, the Mobile & Ohio and other railroads. The region about the city is engaged in farming, cotton being one of the principal products. In the city are cotton and cottonseed-oil mills, lumber mills, stave works, foundries and machine shops, plow factories and manufactories of stoves, yarn, underwear, hosiery and comforts. Among the educational institutions here are the Mississippi State Industrial Institute and College for young women, Franklin Academy and Union Academy, the latter for negroes. There is a public library. Settled in 1830 and

incorporated in 1832, Columbus is governed under a charter of 1884. Population in 1920, U. S. Census, 10,501.

Columbus, Ohio, a city, port of entry, county seat of Franklin Co. and capital of the state, 138 m. s.w. of Cleveland and 100 m. n.e. of Cincinnati, at the confluence of the Scioto and Olentangy rivers, near the geographical center of the state, and on the Cleveland, Cincinnati, Chicago & St. Louis, the Pennsylvania, the Baltimore & Ohio, the Toledo & Ohio Central, the Hocking Valley, the Cleveland, Akron & Cincinnati, the Norfolk & Western and other railroads. Columbus occupies an area of 20 sq. m., the greater part of the city being along the east side of the Scioto in the midst of an extensive plain, and is surrounded for miles by a slightly rolling country. The city is an important center for a large number of interurban electric lines which connect with Cincinnati, Indianapolis, Cleveland, Toledo and other large centers of population and with the intervening hamlets and villages. The city has superior advantages for inland trade. It is situated near the Ohio coal and iron fields and has excellent shipping facilities and important manufacturing interests.

PARKS AND BOULEVARDS. Columbus has many miles of broad streets and shady avenues. In addition to the many handsome suburban homes surrounding Columbus, four residential districts are included within the city limits. In general outline Columbus resembles a Maltese cross. The city extends eight miles north and south and seven miles east and west. The parks include the Franklin, containing 90 acres, the Goodale, the Schiller, Olentangy, Indianola; and the United States military post and recruiting station, named Ft. Columbus, which occupies 80 acres laid out like a park. The state fair grounds adjoin the city and there is a beautiful cemetery of 220 acres.

PUBLIC BUILDINGS. The principal building is the state capitol, completed in 1857. It is situated in a square of ten acres near the center of the city. The building is in the Doric style of architecture, and of limestone quarried in the

vicinity. The capitol rotunda is 158 ft. high, on the walls of which is the original painting by William Henry Powell of Perry's victory on Lake Erie. Other prominent structures are the Federal and Judiciary buildings, United States Pension Building, Franklin County Courthouse, Union Station, Soldiers' Memorial Hall, a Y. M. C. A. Building, United Commercial Travelers' Home, Chamber of Commerce Building, Masonic Temple, Elks' Building, a Carnegie library and many fine office, bank and club buildings. There are about 145 churches, many of them of beautiful architectural design. There are nearly 30 missions. In the capitol grounds are monuments to the memory of Ulysses S. Grant, James A. Garfield, Rutherford B. Hayes, Philip H. Sheridan, William T. Sherman, Salmon P. Chase and Edwin M. Stanton and a handsome memorial arch to William McKinley.

INSTITUTIONS. The educational institutions include the Ohio State University, nonsectarian and coeducational; the Capital University and Theological Seminary (Lutheran), opened in 1850; St. Mary's of the Springs Academy for girls; the Josephinum, a papal college for boys; a number of high schools; several normal schools; many public and parish schools; numerous business colleges; Starling-Ohio Medical College; law and dental schools; an art institute; Ohio State Library; Ohio Medical University; and the city and the Supreme Court of Ohio law libraries. Among the charitable and state institutions are the Columbus State Hospital for the insane, a state penitentiary, asylum for the feeble-minded, schools for the blind, deaf and dumb, the Protestant, St. Anthony's, Children's, Lawrence Emergency and Grant hospitals and a number of private sanitariums.

INDUSTRIES. Columbus is an important distributing center with large wholesale interests. The leading industrial establishments comprise numerous machine shops, steel-billet works, carriage factories, mining-machinery works, boot and shoe factories, car-construction works,

automobile works and manufactories of patent medicines and compounds, brass and bronze goods, iron and steel products, regalia and society emblems, camp furniture, edge tools, bank and store fixtures, saddlery and harness, tile, bricks, soap, soft drinks, hardware, jewelry and agricultural implements. There is also a large market for imported horses and a trade in grain, wool, live stock, coal, iron and dairy products.

HISTORY. Columbus was laid out in 1812 and became the permanent capital of Ohio in 1816. A city charter was granted in 1834. Population in 1920, U. S. Census, 237,031.

Comanche, *Kò man' che*, a tribe of North American Indians once ranging through Texas and Mexico, but now confined to reservations in Oklahoma. They were fierce and warlike, and their final surrender occurred in 1875. They number at present less than 4000.

Combustion, in the ordinary sense, is the chemical union of the substances of the fuel with the oxygen of the air, this union being accompanied by the liberation of heat and, usually, the appearance of light. The common fuels contain as elementary constituents carbon and hydrogen, and the burning of the fuel is really the burning of the carbon and the hydrogen which it contains; therefore the products of ordinary combustion are carbon dioxide and water. Ashes are, in the main, simply the non-combustible material which the fuel contains, and the visible black smoke is unburned, but combustible, material and therefore wasted fuel. In order that ordinary fuels shall unite with the oxygen, a temperature considerably above the ordinary is necessary. This is called the kindling, or ignition, temperature. There are substances, however, which unite with oxygen at ordinary temperatures and, of course, liberate heat in so doing. If conditions are such that the heat does not escape, the temperature may rise so high as to cause the ignition of other combustible material. Under such circumstances the combustion is sometimes described as "spontaneous," but it is read-

ily seen from the facts just stated that the term is inexact. Some kinds of oil of plant origin thus unite with oxygen at ordinary temperatures and so cause to take fire, rags or shavings on which the oil is spread. Painters' waste has been the cause of accidental fires in this way. Likewise the iron sulphide, which is commonly associated with some varieties of coal, may be a source of danger. From similar cause hay in the stack may take fire, and the yellow variety of phosphorus is always extremely dangerous material.

Come'nus, or **Komensky**, **Johann Amos** (1592-1670), an educational reformer and famous writer on education, the last bishop of the old Church of the Moravian and Bohemian Brethren, born in Moravia and educated at the University of Heidelberg. He began his career as a teacher in Moravia. In 1621, during the Thirty Years' War, having lost all his possessions by the Spanish invasion and the persecution of the Protestants, he settled in Poland, where he assumed the direction of a boys' school. His first work, *The Gateway of Tongues Unlocked*, was, within a few years, translated into nearly all the languages of Europe and into several Asiatic tongues. It practically revolutionized the teaching of language. The next year he was elected Bishop of the Moravian Brethren. A more extended pedagogical work followed. The governments of England and Sweden invited Comenius to reform their school systems. In England political conditions prevented, although he visited that country in 1641; but he spent several years in the service of Sweden and greatly improved its schools. His third work, *The World Illustrated*, was published in 1658. This was the first illustrated textbook ever issued. Comenius was the greatest educator of his time, and may justly be considered the originator of many methods and principles now generally accepted.

Com'et, a cloudlike body revolving in an elongated elliptical orbit about the sun, returning at long intervals; or following the curve of a parabola around the sun and never returning. Comets

COMET

usually have a head like a star, called the nucleus, which is the densest part; a luminous appearance surrounding the nucleus and sometimes entirely hiding it, called the coma; and a fanlike tail of diffused light occasionally extending for a long distance across the sky. One or two of these parts are frequently wanting, and a comet often changes its appearance decidedly even in a single night, so that it is recognized upon its return more from the fact that it is due than from its resemblance to its former self. This was true to a considerable extent of Halley's comet, perhaps the most noted of all, which was probably the wonderful object recorded as having been seen about 11 B. C. It is certainly known to have appeared in 1456, 1531, 1607, 1682, 1759, 1835 and 1910; and it may be expected again in about three-quarters of a century from the time of its last appearance.

The velocity of a comet in its orbit and the length of the tail increase as the comet approaches the sun, and soon after the body passes perihelion, that is, the point nearest the sun, the tail reaches its greatest length. The tail always points away from the sun and is the object of supreme interest to the casual observer. It changes form and length rapidly, sometimes giving the comet an entirely different appearance in a single night. The composition of the tail has been a theme for much speculation. It is often millions of miles in diameter and hundreds of million miles in length, yet stars seen through it lose none of their brilliancy and its approach to even the smallest heavenly bodies does not affect their movements.

In all ages comets have been objects of dread and superstition among uncivilized peoples, and even among the civilized nations by whom they are considered to be the harbingers of war, famine or pestilence. Needless anxiety is caused among these people on the approach of a comet by the startling reports in the public press that the comet will strike the earth and suddenly bring all things to an end. No satisfactory explanation of

COMMERCE

the origin of comets is offered by science, nor has their composition been determined with any degree of certainty. See ASTRONOMY; SOLAR SYSTEM.

Comman'der, an officer in the navy ranking next below captain and next above lieutenant-commander. The corresponding rank in the army is lieutenant-colonel. A commander may have command of a ship of the second or third rate, or may act as chief of staff to an admiral. See NAVY; CAPTAIN; LIEUTENANT; ARMY.

Com'merce, the exchange of products or commodities, and especially between peoples or nations living remote from one another. In the United States, commerce wholly within a single state concerns the people of that commonwealth alone, and is subject to the laws enacted by its people; but commerce between the states, or with foreign countries, is subject to Federal statutes and is supervised directly by the Interstate Commerce Commission.

Barter, the direct exchange of one product for another, and trade have everywhere been characteristic of even the most primitive races. The Phœnicians and other early nations engaged in commerce over limited areas adjacent to the Mediterranean, and in history are known as the great commercial peoples of their time; but the invention of the mariner's compass, the discovery of the American continents and of a practicable route by sea from Europe to the Orient (around the Cape of Good Hope) opened a new era. The commercial activities of the 16th, 17th and 18th centuries, however, were largely the result also of that more general knowledge made possible by the invention of printing.

During the past century, the steamboat, railroad, telegraph, telephone, submarine cable and wireless systems, the thousands of inventions which have supplemented these, and the construction of the Suez, Sault Ste. Marie, Panama and other great ship canals have both cheapened and increased production, thus stimulating commerce, as well as making it easier, safer, quicker and more profitable.

The creation of more stable governments, the adoption of a common monetary standard (gold) by all the important commercial nations, the influence of associations, such as Lloyd's and the great boards of trade, the development of international law and the general negotiations of treaties—all these have made for the removal of unnecessary restrictions, and have resulted in a marvelous extension of commerce throughout the world.

To illustrate the rapidity of this development, it may be said that during the 17th and 18th centuries the annual imports and exports of Great Britain and Ireland increased to 15 times what they had been before (from less than £4,000,000 to £62,640,000); while the 19th century multiplied this new total by 12. For the century from 1720 to 1820 the total commerce of the *world* increased from \$428,000,000 to \$1,660,000,000—nearly 400 per cent. But, in 1911, the commerce of the United States alone was considerably more than double this amount; while 1910 reports for 30 nations show that the one and two-thirds billion of 1820 had grown to more than \$30,000,000,000.

Record of the leading nations in 1919:

Country	Exports and Imports
United Kingdom	\$15,924,000,000
United States	13,359,000,000
France	7,428,000,000
Germany	4,966,000,000
Japan	2,103,000,000
Netherlands	1,702,000,000

The tonnage entered and cleared from the five most important commercial cities of the world is as follows:

City	Year	Tonnage
New York	1911.....	26,795,843
Antwerp	1910.....	25,279,483
Hamburg	1910.....	23,000,984
London	1910.....	21,153,797
Hongkong.....	1909.....	20,171,755

In 1790 the commerce of the United States alone was about \$43,000,000, a little more than one-half as much as the present commerce of the Island of Porto Rico. By 1890 it was almost 40 times that sum—\$1,647,139,093; 1910 reported an increase of 100 per cent over 1890.

Fiscal Year	Imports	Exports	Total
1790	23,000,000	20,205,156	43,205,156
1890	789,310,409	857,828,684	1,647,139,093
1900	849,941,184	1,394,483,082	2,244,424,266
1921	3,654,449,430	6,516,315,346	10,170,764,776

The *internal* commerce of the United States, however, far exceeds its foreign commerce, and is larger than that of any other nation. The domestic shipments on the Great Lakes alone totaled 87,000,000 short tons in 1910; while the tonnage of the Sault Ste. Marie Canal (36,395,687) was 50 per cent more than that of the Suez Canal (23,054,901 tons), and about 1,000,000,000 tons of freight were carried by the railroads of the country.

Commerce, Department of, the ninth of the departments of the United States Government. The head of the department, who is a member of the president's cabinet, is the secretary of commerce. This department was created by act of Congress in 1903, as the department of commerce and labor, but in 1913, upon the creation of the new department of labor, it became the department of commerce. The department of commerce consists of the bureaus of corporations and manufactures, the lighthouse board, the steamboat inspection service, the coast and geodetic survey, the bureaus of statistics, navigation, census, foreign commerce and standards. To this department belong also the shipping commissioner and the fish commission.

Commerce, Associations of, organizations of merchants and other business men for the purpose of advancing the civic, industrial and commercial interests of the locality which the organization represents. Various names are applied to these organizations, such as chamber of commerce, commercial club and association of commerce, but all are organized on practically the same plan. An annual membership fee is charged. The general officers usually consist of a president, one or more vice-presidents, a secretary and a treasurer. The secretary is usually the executive officer, is paid a salary and in large cities devotes his entire time to the work. He may have one or more assistants, each of whom is in charge, under his direction, of a special department. The organization is also divided into numerous committees, each of which has charge of some special line of work. Commercial associations usually

render valuable service in inducing manufacturing and other industries to locate in the city, in advancing plans for public improvements and in finding markets for the products of their city.

All large cities in the United States and many smaller ones have a commercial association. They are also found in the large cities of foreign countries. Representatives from these associations throughout the world meet every few years in international conference. The last meeting of this sort was held in Boston in 1912, as the International Congress of Chambers of Commerce. The Chamber of Commerce of the United States of America was formed in 1912, the membership consisting of representatives of commercial associations of the various cities of the country. The headquarters are in Chicago, and the official organ of the organization is *The Nation's Business*.

Commercial Law, in the United States the law which pertains especially to contracts, negotiable papers, such as promissory notes, checks and bills of exchange, and to the customs of merchants. It is sometimes called business law. Commercial law is international in its scope and is the embodiment of the principles governing shipping, which are recognized by all nations.

Commission Form of Government, a system of municipal government now in operation in many American cities. Its characteristic feature is the vesting of the entire responsibility of the city's administration in the hands of a commission composed of a few men, usually five, elected by the citizens at large without regard to ward boundaries, party politics or class distinctions. To this commission are granted all of the powers of legislative and executive action vested in the city council, special boards and various officials of the old system.

The commissioners give their entire time to managing the affairs of the municipality, and receive adequate salaries for their services. All other city officials are appointed by the board of commissioners, to whom they are responsible for

the efficient performance of their work, while the commissioners are themselves directly responsible to the people. This responsibility is usually made more vital by the incorporation of initiative, referendum and recall features into the plan. Thus centralization of authority is safeguarded by definiteness of responsibility.

In order to facilitate simplicity and efficiency of organization, each commissioner is put at the head of a distinct department of city administration, the mayor serving as chairman of the board. The law of Iowa authorizing the commission plan of government, which may be taken as typical, divides these departments as follows:

Department of Public Affairs, of which the mayor shall be the head.

Department of Accounts and Finance.

Department of Public Safety.

Department of Streets and Public Improvements.

Department of Parks and Public Property.

The commission plan was introduced into the city of Galveston, Texas, in 1901, and hence is sometimes called the *Galveston Plan*. The modified form adopted by Des Moines, Iowa, in 1907, known as the *Des Moines Plan*, has attracted wide attention and has been copied by many other cities throughout the country. The system is steadily growing in favor as a means of eliminating political influences and securing a business administration of municipal government. See MUNICIPAL GOVERNMENT.

Committee of the Whole. In a law-making body proposed legislation is considered in committee before being presented to the whole assembly for definite action. It is sometimes desirable that the whole body participate in the consideration of the report, and in such case the members resolve themselves into a committee of the whole. Upon motion to that effect the presiding officer leaves his chair and calls another member to take his place. The body is thus organized into a committee of the whole, and discussion of the topic may proceed along parliamentary lines. The temporary chairman

is the recognized chairman, and after the regular organization is resumed he makes a report to the legislative body of the action of the committee.

Committees of Correspondence, a name used to designate committees appointed by the various colonies before the Revolution to secure united action in opposing the claims of England. In November, 1772, Samuel Adams moved before the Boston town meeting that a Committee of Correspondence be appointed to act as an agent for keeping in touch with the various other districts of New England and to state the rights of the colony, the proceedings being kept secret. About 80 towns in Massachusetts responded at once, and the plan was a great success. The following March a similar committee was advocated before the Virginia Legislature by Patrick Henry and Richard Henry Lee; but the committee which was at length permanently appointed was to maintain a correspondence with the sister colonies. Later, Rhode Island, Connecticut, New Hampshire and South Carolina had committees of a somewhat similar nature.

Committees of Safety. In American history committees of safety were public functionaries of a type first appearing in England in the 17th century. In 1763 when the English Government attempted to enforce the trade and navigation acts in America the colonial leaders advised the appointment of committees to help forward a union of interests. In Massachusetts, as affairs drew near a crisis, it became usual for towns to appoint three committees, of correspondence, of inspection and of safety. The first was to keep the community informed of dangers and to formulate measures for the public good; the second to watch for violations of nonimportation agreement; and the third to act as general executive while the legal authority was in abeyance. These committees were regularly legalized by the General Court in February, 1776, but consolidated into one and called the Committee of Correspondence, Inspection and Safety, to be elected annually by the towns. This committee

was empowered to call out the militia, take charge of confiscated property and prisoners of war and enforce the laws against Tories.

New York had also a committee of safety of 100 men, but partly on account of the size of the committee and the undeveloped politics of the time, an inner committee was formed which was named the Sons of Liberty. This committee directed the operations of the first safety committee.

Com'modore, in the United States navy, formerly an officer ranking next above a captain. Congress abolished the grade in 1899, and promoted all commodores to the rank of rear-admiral. In the English navy the commodore has charge of a detachment of ships. The salute of the commodore in the United States navy is 11 guns. See NAVY.

Common Carrier, a corporation or person that transports passengers or goods for hire. A common carrier is bound to carry all unobjectionable goods of any person who presents them to him for shipment and offers to pay the charges, and is subject to penalty if he refuses without good and sufficient reason. He is also liable for loss, damage or delay while the goods are in his charge, provided a legal delivery of them into his possession has been made. He is not liable for damages or delay caused by floods, heavy snows or impassable roads.

Common Council, the name sometimes applied to the legislative board of a city or an incorporated town, whether composed of one or two branches. The term *city council* is more frequently used in the United States and *common council* in England.

Common Law, the old English system of laws originating in custom and usage. It consists solely of rules of action handed down by tradition as the custom and tendency of the times. Common law has never been reduced to a code or to classification. It is found in rare treatises and in court decisions, and these were sanctioned by public opinion as having the binding force of statutes. Later, courts based their decisions

upon those of the earlier times, and thus through succeeding generations common law gained strength. Strictly speaking, the United States has no common law. What is referred to as such is the old law of England brought to this country by the early colonists. After the Revolutionary War this law became the foundation for much of the statutory law enacted by state Legislatures.

Common Schools, the name generally given those schools devoted to teaching the common branches. In the United States the term means public schools below the high school. In Germany it means the *volk-schule*; in France it means the primary school; and in England it means the elementary school. This article is chiefly concerned with the common schools of the United States; for the development of the schools of other countries, the reader is referred to the general article, **EDUCATION**.

THE COLONIAL PERIOD. Public education was given early attention in the American colonies. Between 1619 and 1622 Virginia took steps toward establishing a system of public education, but Indian wars frustrated the plans and they were not again taken up during the colonial period. The Dutch in New York also established a system of schools patterned after the system then in vogue in Holland. These schools were discontinued with the occupation of the colony by the British, and no free schools were established in New York until after the Revolution. It is to Massachusetts that we must look for the origin of the American common school. In 1635 Boston provided for a common school. In 1642 a legislative act gave the selectmen in every town the power to supervise the employment and the education of children, and in 1647 the General Court enacted a law which laid the foundation not only of the educational system of Massachusetts but of the United States as well. This act is also noteworthy as being the first of its kind in the world. It required every town of 50 householders to establish a school, the teacher of which should be paid either by public tax or by the par-

ents, as the majority of the town committee might decide. This act further required all towns of 100 families or householders to establish a grammar school in which pupils could be prepared for the "University," as Harvard College was then called. Any town failing to comply with the requirements of this act was subject to fine, the fine to be used in support of the nearest school.

The other colonies in New England adopted the Massachusetts plan, and previous to the war for independence, all were fairly well supplied with elementary schools. Industrial conditions in the Southern colonies made the establishing of common schools impracticable. The large landholders employed tutors for the children and the boys of the most wealthy families were sent to England to finish their education. For the children of the laboring class there were few educational opportunities. Attempts to establish public schools were made in the Middle colonies, New York, New Jersey and Pennsylvania, but little was accomplished during the colonial period.

STATE SYSTEMS. The Revolutionary War so taxed the resources of the country that any considerable revenue for educational purposes was impossible. The Federal Constitution made no provisions for public education, leaving this duty to the several states in accordance with the policy pursued previous to the war. Furthermore, the relation of the National Government to education was not at that time clearly defined. The original plan was that each community should be responsible for educating its children and that the expenses should be met by local taxation. As the number of schools multiplied, however, it became evident that a broader plan of taxation must be adopted, and each state assumed a share of the support of its common schools. But this result was not reached at a single step. With the exception of Massachusetts all states for a number of years considered free public schools as charitable institutions maintained especially for the children of parents too poor to pay local taxes. Wherever such a view

was held, the schools were looked upon with contempt, and it is needless to say that they were not patronized by those for whom they were intended. In the New England States this false idea gradually disappeared, and it was in these states that the common schools first assumed their true position.

The Public School Society of New York was formed in 1805 for the purpose of providing instruction for those children whose parents were unable to provide it themselves, but the plan was soon broadened to take in all children who applied. From this to the support of the schools by the state was an easy step, and in this way the New York system was established. Pennsylvania was somewhat behind New York, and in the South the system established in the colonial period continued until the Civil War. Emigration moved westward along parallels of latitude, and the states in the central and western part of the country established systems similar to those in the states from which the settlers came. Thus we find the New England and New York plans, modified to meet local conditions, firmly established in all the Central and Western states north of the Ohio River. Similar systems have also been placed in operation in all the Southern States since the Reconstruction Period.

Administration. In the organization and management of its public schools each state is a law unto itself, but there are only three systems of local organization and management throughout the country. These are the district system, the township system and the county system. The district system is the outgrowth of the Massachusetts law of 1647. It has the advantage of making every community directly responsible for the education of its children and thereby securing a vital interest of the patrons in their local school. It has the disadvantage of unequal taxation and, in many instances, of inadequate support. A school district with a low valuation may have a large school population and an adjoining district may have a high valua-

tion and a small school population. To remove this and other difficulties the district system has been superseded by the township system in New England and in some other states. Since there are no townships in the Southern States the county is the unit for administration. Outside of New England the county is the unit for supervision, and upon the county superintendent devolves the duties of licensing teachers, visiting schools and keeping such records as the state requires.

In their development the public schools have kept pace with the growth of the country. In all cities and in most of the large towns the schools are graded and are under the immediate direction of a city superintendent, and in the smaller towns, of a supervising principal. The graded school prepares pupils for the high school, and in many states the high schools are affiliated with the state university.

The rural schools in many states are also graded and provided with carefully prepared courses of study. Moreover, in several states laws have been enacted which enable districts to consolidate. This movement does away with the old one-room school and enables the district to maintain one or more central schools, as necessary, which have all the advantages of a graded school in a small city. Under the provisions of such a law, a part of the school revenue is used in transporting pupils to and from school. This assures regularity of attendance regardless of the conditions of weather and roads. Moreover, in the school buildings of consolidated districts, ample provision can be made for teaching manual training, domestic science and the elements of agriculture, all of which are demanded by the courses of study for rural schools in many states.

Every state has a department of public instruction, which may consist of a state superintendent of public instruction and such assistants as he appoints, or of a board of education, whose secretary usually discharges the duties of a state superintendent. The qualifications for teach-

ers' certificates are usually fixed by legislation. Wherever state certificates are granted, the duty of preparing questions and conducting the examination of candidates for such certificates devolves upon the department. As to other duties, they vary widely in different states, in some being only advisory, while in others the state superintendent has executive power.

NATIONAL POLICY. *Land Grants.* The relation of the Federal Government to education is financial rather than administrative. The first step towards national aid to the common schools is found in the Ordinance of 1787, which contains the following declaration: "Religion, morality and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged." The ordinance then goes on to reaffirm the Land Ordinance of 1785, which set aside section 16 of every township for the maintenance of public schools within the township. Thus one-thirty-sixth of the Northwest Territory was donated to the support of public schools, and from the sale or lease of these "school lands" the public school fund in most of the states formed from this territory is derived. This became the policy of the nation, and each state admitted previous to 1848 had section 16 in every township set aside for school purposes. In 1848 another section was added, and, with the exception of Utah, each state admitted since that date has had sections 16 and 36 set aside for its common schools. In some states this land is leased and in others it is sold and the money placed at interest. In addition to the grants for common schools the government gave two townships in every state containing public lands for the support of seminaries or universities, and in 1862 a third grant was made for agricultural colleges. In all, these grants amounted in 1900 to over 86,000,000 acres or nearly 133,300 sq. m., an area larger than the New England States, Illinois, New Jersey and Delaware combined, or as large as the Kingdom of Prussia.

Surplus Revenue. In 1836 President

Jackson ordered about \$28,000,000 belonging to the United States to be distributed to the states; apportioning it according to population. Most of the states used their share of this money to create a permanent school fund.

Bureau of Education. The National Bureau of Education was established in 1867. It is presided over by a commissioner of education, who is under the direction of the secretary of the interior. The duties of the bureau are to collect statistics and publish annual reports and such other matter as may advance the interests of public education throughout the country. See EDUCATION, COMMISSIONER OF.

Government Schools. The United States Government maintains schools for the education of Indians on reservations and for all children in Alaska. Industrial training occupies a prominent place in these schools. See INDIANS, subhead Education.

Uniform Systems. While officially there is no national system of education, the systems in the several states are so near alike as practically to constitute a national system. The agencies most influential for securing and maintaining this uniformity are the bureau of education, which, through its reports and the statistics compiled and given out, places annually before the country a general survey of public education, and the department of superintendents of the National Education Association, at whose annual meetings the systems, courses of study and methods of instruction in vogue in the leading states and cities are criticized and discussed. See HIGH SCHOOL; NORMAL SCHOOL; UNIVERSITIES. Consult Boon, *History of Education in the United States*.

Commune, *Ko mune'*, of Paris, a committee which took the place of the municipal government of Paris in 1789, and which later ruled all France. Among its chief members were Robespierre, Danton and Hébert. The Commune is also the name given to a rebellion in France almost wholly confined to the Radical Party in Paris, in 1871. It arose

from the discontent of the people after the Franco-German War and the fear that a monarchy would again be established. Many public buildings were destroyed, and desperate fighting continued in the streets of the city for ten weeks. During the last ten days 68,000 communists fell. On May 28, 1871, Paris was taken and the leaders of the Commune were executed or transported.

Com'munism, a term in social and economic theory signifying the abolition of private property and the absorption of it by the state or the community as a whole. It differs from socialism, which advocates the socialization of capital and means of production, but not equal distribution of wealth. The term communism is applied to the schemes for the organization of ideal communities where men work and hold property in common.

In the United States several attempts have been made to establish communities of this kind. The Brook Farm experiment, attempted near West Roxbury, Mass., resulting from the teachings of Fourier, is the most widely known, and has historical significance because of the eminent men and women who were connected with its development. Others are the Society of Shakers, a religious movement; the Owenite communities founded by Robert Owen; the short-lived Icarian organizations established by Étienne Cabet; and some 40 Fourierist communities, similar in purpose and design to the Brook Farm movement.

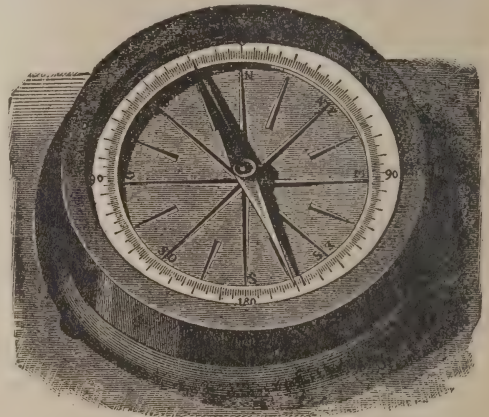
Consult Morris Hillquit, *History of Socialism in the United States*; Charles Nordhoff, *Communitistic Societies of the United States*.

Com'muta''tor. See DY'NAMO; ELECTRIC MOTOR.

Com'pass, Magnet'ic, an instrument for determining direction in reference to the north and south. Compasses are divided into three classes, the surveyor's compass, the mariner's compass and the variation compass. The surveyor's compass consists of a magnetic needle resting on a pivot and swinging freely over a horizontal circle divided into degrees and provided with sights. When these sights

are placed in line with an object, the point of the compass needle will show the angle which this direction makes with the magnetic meridian. This instrument is further provided with a device for maintaining a level. The compass is mounted on a tripod so as to be easily transported and quickly set up.

The mariner's compass is used on board ship. In its improved form, as invented by Lord Kelvin, it consists of several magnetic needles (See MAGNETIC NEEDLE) arranged parallel to each other and attached to a circular card, which is mounted at its center upon the end of an upright pivot. This arrangement is enclosed in a box of brass, which is



COMPASS

suspended within a wooden casing on trunnions in such a way that the compass card always remains horizontal. This card is divided into 32 equal parts by radial lines. The spaces between these are divided into halves and quarters, so that all of the 360 parts or degrees of the circumference are indicated. The cardinal points are designated as north, south, east and west, and the names of the other points are shown on the card as compounds of them. To determine the course of the ship, the number of degrees between the north pole of the needle and the direction of the ship, as indicated by a line from the center of the steering wheel to the point of the bow of the ship, is taken and counted in points of degrees. See NAVIGATION.

Compass Plant, a name given locally to any plants whose leaves are arranged in fours about the stem, thus seeming to indicate the four cardinal points; the name, however, is accurately applied only to a prairie herb of the Composite Family. The plant received its name because the bright sunlight causes it to turn its leaves to receive the light less directly. Thus they "stand on edge" and take a generally north and south position. The stems are stout and rough, often from three to six feet in height. The root leaves are coarse and deeply cut, but as they near the flower heads the leaves become smaller and less lobed. The flowers are borne in large heads surrounded by many green scales, and are always yellow in color. The plant is also known as rosin plant or rosinweed. It is found west and south from Michigan in the Prairie States.

Competition, in economics, the rivalry of independent parties, whether individuals or firms, who are striving for the same goal. Competition enters into all lines of endeavor, but it is usually keenest where the strife is for goals of an economic nature, as where two firms are competing for the same line of trade. The general law is that the consumer will buy in the cheapest market, and the producer will sell in the highest market; therefore, the selling price being the same, the dealer who sells the better grade of goods will secure the larger trade. If both price and quality are the same, the dealer who is able to produce the grade of goods at the lower cost will gain the greater profit. Competition becomes more keen as labor-saving machinery increases the output and lowers the expense of production.

Compos'ite Family. See BOTANY, sub-head *Classification*.

Com'pound, in chemistry a substance which has been formed by the union of two or more elements and always contains them in the same proportion by weight. A compound is distinguished from a mixture in that its properties differ from those of its ingredients and its constituents cannot be separated by other

than chemical means. For example, if flowers of sulphur, a bright yellow powder, and iron filings are heated together, a dark gray metallic mass is formed which has characteristics differing from both iron and sulphur. This resulting mass, which is called iron sulphide, is a compound. If, however, the two are stirred without the application of heat, the particles of sulphur are always distinguishable and may be separated by water; a mixture, not a compound, has been formed. See ELEMENT.

Com'promise of 1850, otherwise known as the Omnibus Bill, an act of Congress passed in August, 1850, to allay the strife over slavery by granting concessions to both parties. It contained the following propositions: that California be admitted as a free state; that the remaining territory obtained from Mexico be organized into the territories of Utah and New Mexico without reference to slavery; that Texas be paid \$10,000,000 to relinquish her claims upon New Mexico; that the slave trade be abolished in the District of Columbia; that the South be granted an effective fugitive slave law. When this bill was first reported out of committee it contained but two propositions; the others were added from time to time as compromises and these brought forth the comment that the bill was like an omnibus—always having room for something more. All of the propositions enumerated became laws and were in force until 1854, when they were virtually repealed by the Kansas-Nebraska Bill.

Comptroller, *Kon tro'ler*, of the Treasury, the officer of the United States Treasury Department next below the secretary of the treasury and his two assistants. This office was created in 1789, and in 1817 a second comptroller was provided for. The first comptroller examines all accounts which are passed by the first, fifth and sixth auditors of the government. He must countersign all warrants drawn for the payment of money by the secretary of the treasury. The second comptroller examines accounts of the second, third and fourth au-

ditors. He countersigns all warrants for the payment of money issued by the secretary of war and secretary of the navy. Warrants from other departments are divided between the two comptrollers. The salary is \$5500 per year, and appointment is by the president with consent of the Senate.

Comte, *Kont*, Isidore Auguste Marie François Xavier (1798-1857), a celebrated French philosopher, the founder of the positive philosophy, or Positivism. He was born at Montpellier and was educated at the Ecole Polytechnique in Paris. In 1816 he became a private tutor. Early in life he enthusiastically embraced the social philosophy of Saint-Simon, but later broke away from it. In 1826 he began delivering at his own house lectures on his philosophy, and had many distinguished hearers. After a period of mental incapacity, induced by overwork, he resumed his lectures and in 1830 began the preparation of his *Course of Positive Philosophy*. This he completed in six volumes after 12 years. Meanwhile, in 1835 he had secured a position as entrance examiner for the Ecole Polytechnique, which he held for about ten years. Thereafter he was supported chiefly by his pupils and friends. His great work has been translated into English, in an abridged form, by Harriet Martineau.

The governing idea of Comte's system is that both the individual and the human race pass through three intellectual stages: the *theological*, in which a supernatural cause is assigned to all phenomena; the *metaphysical*, in which abstract forces or entities take the place of the gods; and the *positive*, in which the mind abandons the search for theological and metaphysical causes and restricts itself to the observation and classification of phenomena, with a view to the discovery of their laws and the comprehension of the universe as a whole.

When civilization has arrived at the last stage (which he conceived to be the case in Europe in his day), science is born. Comte then undertook the classification of the sciences, proceeding

from the simple or general to the complex, as follows: mathematics, astronomy, physics, biology (including psychology as essentially physiological), sociology. Each of these sciences incorporates the laws of the preceding and adds laws peculiar to itself. Thus sociology becomes the final and inclusive science. He then proceeds to discuss the institutions of society as consisting of the family, the community made up of families, and the State, or government.

After Comte had fallen deeply in love, the spiritual and religious cravings of humanity, heretofore overlooked, found expression in his invention of a religion in which the whole harmony of existence is centered in one great Being, termed Humanity, to be worshiped in the persons of heroes who have been the great benefactors of the human race. He assumed the rôle of high priest of this new Religion of Humanity. Comte is the father of sociology. However extravagant some of his ideas may be, others have had an abiding influence, especially his insistence upon the observation and classification of phenomena, his hierarchy of the sciences and the impulse which he gave to the scientific study of society.

Concepcion, *Kon sep syone'*, a seaport of southern Chile, capital of a province of the same name, situated on the Bio-Bio River, 7 m. from its mouth. It is an Episcopal see and the seat of a court of appeals. Among its chief buildings are a cathedral, several fine churches, an agricultural school, a normal school and a town hall. Flour mills, furniture and carriage factories, distilleries and breweries represent the important industries. Concepcion was founded by Valdivia in 1550, was several times destroyed by earthquakes and twice burned. Population in 1905, estimated at 49,351.

Con'cept, a representation in the mind of a general idea. This may be best understood by a specific illustration. When a child first sees a dog his idea of "dog" is merely a mental image of the one that he has seen, a spaniel perhaps. Later he sees a greyhound, a terrier and a St. Bernard, which he also comes to

recognize as dogs, and from these various images his mind forms a typical or composite picture of dog. The word no longer brings to his mind the definite image of a spaniel but a somewhat indistinct one of the whole class.

There are three steps in the mental process by which a concept is formed—comparison, abstraction and generalization. First the likenesses of certain objects are so brought before the mind that a definite relation is seen to exist between them, and their points of resemblance are especially noted; this is comparison. But objects belonging to one class still have wide differences; the spaniel and the greyhound differ in form, color, size, habits, coat, etc. To direct the mind away from these differences, to ignore these and to recognize that the two animals belong to the same class in spite of these, is the second step, known as abstraction. Finally, likenesses having been established and minor differences rejected, the notion of *class* has been formed by generalization.

Since concepts are made accurate only through observation, the training of this power is important. It enlarges the concept and makes it more clear and yet more complete. Hasty generalizations must be avoided, and to this end a child should be aided by having his observation directed toward the discovery of likenesses and differences. Early impressions are the most lasting, and thus false concepts formed in childhood tend toward a confusion of thought later.

Concepts of purely mental objects which cannot be presented to the senses are not formed until after the mind has a store of those concepts which are based upon observation and which have resulted in thinking. Thus the abstract teachings of arithmetic, grammar, etc., and such subjects as logic, psychology and much of mathematics are not comprehensible to the untrained mind.

Conception, *Kon sep' shun*, in psychology, the process of attaining, by means of comparison and generalization, an idea which is common to several experiences. The idea so attained is called

a concept. By the process of conception we attain sense ideas, as those of size, color, sound, weight and direction; and relation ideas, as those of number and quantity. See CONCEPT.

Concertina, *Kon" ser te' na*, a small, hexagonal, musical instrument, similar in construction to the accordion, but an improvement on that instrument. The English concertina has a compass of from three and a half to four octaves, with all the intermediate semitones, and is a double-action instrument, that is, it produces the same note on expansion or compression of the bellows. See ACCORDION.

Conch, *Konk*, a name formerly applied to certain kinds of spiral shells borne by a class of Mollusks, and well known when the Mollusks were classified according to the form of shell. At present the name refers to any shell, generally of one valve, and the study of shells is called conchology. Conches were once used in this country as dinner horns and for this purpose were fitted with a mouthpiece. In Eastern countries a sort of musical instrument is made from them.

Concord, Mass., a city of Middlesex Co., 20 m. n.w. of Boston, on the Concord River, here formed by the junction of the Assabet and Sudbury rivers, and on the Boston & Maine Railroad. It is situated in a beautiful rural district and is chiefly a residential city. At Concord Jct. are several industries; harness, chain, webbing factories, and a foundry. Concord is the oldest interior town in the state, having been settled in 1635. In August 1774, the Middlesex Convention, the first county convention assembled in Massachusetts, was held in Concord, every town being represented. In an attempt by the British to destroy large quantities of ammunition and military supplies which were stored here occurred the skirmish on Apr. 19, 1775, which precipitated the Revolutionary War (See LEXINGTON, BATTLE OF). The Massachusetts Reformatory is located here. Among the persons of literary eminence who made Concord their home are Emer-

son, Thoreau, Hawthorne, Louisa M. Alcott and William Ellery Channing. Population in 1920, 6,461.

Concord, N. C., a city and the county seat of Cabarrus Co., 21 m. north east of Charlotte, on the Southern railroads. The surrounding district is adapted to cotton growing. The city contains foundries, machine shops, roller mills, brickworks and manufactories of cotton goods and furniture. Concord is the seat of Scotia Seminary, for negro girls, founded in 1870 and controlled by the Presbyterian Board of Missions for Freedmen. The city was platted in 1793 and incorporated in 1851. Its recent growth has been rapid. It is governed under a revised charter of 1891. Population in 1920, U. S. Census, 9,903.

Concord, N. H., capital of the state and county seat of Merrimack Co., 18 m. n. of Manchester and 73 m. n.w. of Boston, on the Boston & Maine Railroad. The city is well laid out, with broad streets, and has fine municipal buildings. Concord has abundant water power and extensive manufactories of carriages and wagons, furniture, machinery, leather belting, autos, silverware, electrical appliances, cotton and woolen goods, boots and shoes, flour, twine and other articles. In the vicinity are extensive quarries of excellent white granite, the quarrying of which is one of the leading industries, and which is largely exported. St. Paul's School (Episcopal) and St. Mary's School for Girls are located here. The city also contains a state prison, state hospital for the insane, government buildings and a state library. The car shops of the Boston & Maine Railroad are situated here. Concord was founded in 1725, on the site of Pennacook, the chief village of the Pennacook Indians, and bore that name until 1733. It was then incorporated as the town of Rumford. In 1765 Rumford was renamed Concord. On the adoption of a state constitution it became the capital of New Hampshire. It was incorporated as a city in 1853. Population in 1920, 22,167.

Concord, Kon'kerd, Battle of. See LEXINGTON, BATTLE OF.

Concor'dia, in myths, Roman goddess of harmony. Of her many temples the oldest and most magnificent, erected on the Forum B. C. 367, was twice rebuilt. It sometimes served as the Senate House and in it Cicero delivered his last oration against Cataline (See CICERO, MARCUS TULLIUS). On the birthdays of the emperors offerings were made to Concordia, who was represented as a matron bearing a scepter and olive branch. Her symbols were two clasped hands and two snakes entwining a staff.

Con'crete, an artificial stone composed of hydraulic cement, sand and stone chips or gravel. The proportion of ingredients vary as the proposed use of the concrete varies. The general rule is: One part cement, two parts sand, four parts stone. Concrete is extensively used for foundations of bridges and other structures and for the construction of buildings. For foundations, caissons are first constructed, and those are filled with the moist concrete as fast as it is made. The cement soon "sets" and transforms the entire mass into solid rock. When used for the walls and partitions of buildings, the concrete is strengthened by steel rods, which are put in place as required by the architect's plans before the concrete is poured into the molds. As a building material concrete is strong, more durable than stone and can be easily fashioned into any form desired. See CEMENTS.

Condé, Kon da', Louis de Bourbon, PRINCE (1621-1686), a noted French general. He was educated in the Jesuit seminary at Bruges, and at the age of 18 was made governor of Burgundy. Having entered the military service, in 1643 he severely defeated the Spanish at Rocroi, following this victory with successes at Nördlingen and Dunkirk. Later he was given command in Netherlands, but was recalled to Paris to suppress the uprising known as the Fronde. He at first sided with the court, but, believing himself unfairly treated, headed the opposing factions and was imprisoned on the advice of Mazarin (See MAZARIN, JULES). On his release he was again in rebellion

against the court, and, after an indecisive conflict with the royal troops headed by Turenne, in 1652, he went to Spain. In 1659 Condé was pardoned and again entered the service of France, in 1674 fighting against William of Orange at Seneffe. The following year he succeeded Turenne in command of the army on the Rhine. His last years were devoted to literature, religion and the society of his friends.

Con'densa'tion of Gases. See VAPOR.

Condensed Milk. See MILK.

Con'dor, a bird of the Vulture Fam-

food of the bird. It is said that the condor will also attack sick and otherwise disabled animals. No nest is made, the two white eggs being laid on the bare rock.

The natural home of the condor is the Andes, where it may be seen soaring high above the loftiest peaks. It ranges in western South America from Ecuador to Patagonia.

Coney, Ko'ny, Island, an island forming a part of the city of New York near the entrance of New York Harbor and at the southwestern extremity of Long



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ily. The condor is the largest of birds, with the exception of the ostrich. It measures over four feet in length and the huge wings have a spread of about nine feet. The color of the male is a rich, shining black, with a whitish patch on the wing, and a ruff of white down encircling the neck. The head and neck are bare of feathers and are more or less wattled. The female lacks the wattles and the plumage is duller. The heavy, hooked beak is well adapted for tearing carrion, this being the principal

Island. It is about five miles in length and but one-half mile in width. It is a popular pleasure resort for the city and connects with the borough of Brooklyn by rail and with the business center of New York by rail and ferry. Sections of the island are known as Brighton, West Brighton, Sea Gate and Manhattan Beach.

Confec'tionery. See CANDY.

Confed'erate States of America, or The Confederacy, the federation formed by the 11 states that seceded from the

Union in 1860 and 1861. On Dec. 20, 1860, South Carolina passed an ordinance of secession. During January, 1861, Mississippi, Florida and Alabama followed her lead. A convention of delegates from these states and from Georgia and Louisiana met in Montgomery, Ala., Feb. 4, 1861, to form a federation. These delegates organized as a "Provisional Congress of the Confederacy," and adopted a provisional constitution to be in force one year from the inauguration of the president, or until a permanent constitution was adopted. Jefferson Davis of Mississippi was chosen temporary president, and Alexander H. Stephens of Georgia, temporary vice-president. During the year, Texas, Arkansas, Virginia, North Carolina and Tennessee joined the Confederate States. A permanent constitution was adopted by the Congress in March, 1861, and sent to the states for ratification. Departments of government similar to those of the Government of the United States were established, with men of exceptional ability at their respective heads.

Congress made provisions for an army and began to construct a financial system. In November, 1861, Davis was elected permanent president, and Stephens, permanent vice-president. The capital was removed to Richmond, Va. The life of the Confederacy was about four years. During this time the stress of war placed such exigencies upon the government that there was not opportunity to give the constitution a fair trial. While it was based upon the Constitution of the United States, the constitution of the Confederate States differed from that instrument in granting less power to the central government and thus leaving more authority to the states, and in giving members of the president's cabinet seats in Congress. See CIVIL WAR IN AMERICA.

Confederate Veterans. See UNITED CONFEDERATE VETERANS.

Confed"era'tion, Articles of, the written instrument of government adopted by the thirteen states in America in 1781. At the outbreak of the Revolutionary

War each state, hitherto a colony of Great Britain was an independent sovereignty, but the exigencies of the times demanded some plan of general government and on the day which witnessed the appointment of the committee to formulate a declaration of independence another committee was appointed to devise a plan for the union of the states and the establishment of a central government. The committee consisted of one delegate from each state, with John Dickinson at its head. The draft of the Articles was presented to the Colonial Congress then in session, on July 12, 1776, and debated at intervals until November, 1777, when the Articles were adopted by Congress. They were then submitted to the Legislatures of all the states, whose unanimous consent was necessary to their final ratification.

By March 1, 1781, all the states had signed the Articles, which declared that the Confederation was to be known as the United States of America and that each state should retain its sovereignty with all rights and powers not expressly delegated to the United States. The government was to be in the hands of Congress, composed of not less than two nor more than seven delegates from a state, each state, however, to have but one vote. Congress had no power to raise revenue, compel observance of law, guarantee repayment of money, etc. No power of Congress on any important matter could be exercised until the question had received a prior affirmative vote of at least nine of the thirteen states. After the war period the imperfections of the system became more apparent and the result was the Constitutional Convention and the adoption in 1787 of the Federal Constitution.

Confucius, *Kon fu' shi us*, (551-478 B. C.), the distinguished Chinese sage and founder of Confucianism. The name means teacher. He was born in the Province of Shantung in the State of Lu. His father was a soldier of royal blood, who died when Confucius was three years old, leaving the family in very humble circumstances. At the age

of 17 Confucius became manager for a wealthy landowner of Lu. Two years later he married. At the age of 22 he began his career as a teacher, and for over 50 years he continued his work, migrating from place to place. At the age of 30 he had thought out his philosophy to his own satisfaction. In 517 he gained his first pupils of importance, and the same year visited the capital of the district, where he met Lao-Tse, the founder of Taoism. At the age of 52 he was made chief magistrate of Chung-tu, in which position he was so successful that he raised his State of Lu to a leading position in China. The jealousy of the governor drove him to a life of wandering for 13 years, from which he returned in 485 B. C. to remain in private life.

Confucianism is, strictly speaking, an ethical and political rather than a religious system, as it does not consider the relation of man to a higher power. The teaching of Confucius, which was devoted to practical morality and the duties of man in relation to his fellow men, has had an immense influence on the Chinese people. Confucius also enunciated the Golden Rule in negative terms. His connection with literature was important. China had a literature before Confucius, but her ancient records were in danger of perishing because of the disorders in the kingdom. He therefore gathered up and preserved the ancient writings, and, though an editor rather than an author, he may be regarded as the founder of Chinese literature. His one independent work, aside from the sayings recorded by his disciples, is the *Ch'un Tsin*, or *Spring and Autumn Annals*, a history of the Province of Lu from 721 to 480 B. C. The *Ch'un Tsin* is grouped with four other books, the *Shih Ching*, the *Li Ching*, the *I Ching* and the *Shu Ching*, forming the "five classics," the canonical books of Confucianism. These are accompanied by the four books left by his disciples, the *Lun Yü*, *Ta Hsüeh*, *Chung Yung* and the *Hi-tse*.

Con'ger, Edwin Hurd (1843-1907), an American diplomat, born in Knox County, Ill. He was a graduate of Lom-

bard University, Ill., and of the Albany Law School. He served during three years of the Civil War, attaining the rank of brevet major, and accompanied Sherman in his march through Georgia. Removing to Iowa in 1868, he engaged in business for several years. From 1885 to 1891 he served in Congress, resigning in the latter year to become United States minister to Brazil. Conger's reputation rests chiefly upon his splendid work as United States minister in China during the Boxer uprising in 1900, when he rendered an international service in securing the relief of Peking. In 1905 he was appointed ambassador to Mexico, but resigned after a few months.

Con'ger Eel, a family of scaleless eels found in both America and Europe. These eels may be recognized by their large size, free tongues and their fin-encircled tails. In color they are either dull gray or brown above and lighter below. The fins are generally edged with black. Though their flesh is not particularly prized here, in Europe and the East Indies they are used as food. In America conger eels are found in salt water from the New England coast to Brazil; other species are found on the coast of Asia and Africa.

Con'go, or Kongo, one of the large rivers of the world and the largest of Africa. It rises in the highlands of Rhodesia under the name of Lualaba and flows north through Congo State, then west and finally southwest into the Atlantic Ocean. Near its source there are many cataracts, and all along its course, tributaries, many of great size, add to its volume; some of the largest of these are the Lomami, the Aruwimi, the San-kuru and the Makua. The basin of the Congo presents the features of a former inland lake bed, the lake probably having been drained away by the Congo. In one region between Stanley Pool, not far from the mouth of the river, and the Yelala Falls, there is a descent of 900 ft. in 170 m., and there are 30 distinct cataracts. Above the falls steamers ply regularly on the main stream and its largest tributaries. The principal cities along its

course are Banana, Boma, Matadi, Ankolo and Nyangwe.

Congo State, a Belgian possession of central Africa occupying the entire basin of the Congo and its tributaries, and reaching from the Nile basin to the Atlantic coast. The narrow strip which reaches to the mouth of the Congo River lies between the French Congo and Angola. Physically the country consists of a broad plain surrounded by highlands and mountains. These are covered with vast and almost impenetrable forests, rich in natural products and infested with wild animals. Rubber, coffee, cacao, sugar, cotton, tobacco, copal, ivory, gold and copper are the chief products. The natives are of various tribes of Bantus and Pygmies, many of which are said to still have cannibalistic tendencies. Banana and Boma are the principal cities, Boma being also the capital. Congo State was founded in 1884 and was annexed to Belgium in 1908. The area of the Congo is 909,654 sq. m., and the population is estimated as varying between 9,000,000 and 20,000,000.

Con'grega'tionalists, the Protestant denomination whose members believe that every congregation of Christians should be an independent body. In England the Congregationalists are known as Independents. It is the right of every Congregational church to elect or depose its officers, to discipline its members and to decide upon its form of worship. The church officers are the pastor, deacons and clerk, a treasurer and Sunday School superintendent. Expenses of every nature are met by voluntary offerings. Local churches unite to form state organizations, and the state organizations elect members to a national council which meets every three years. Among the institutions of higher learning founded by the Congregationalists of the United States are Yale, Dartmouth and Amherst colleges, Andover Theological Seminary, Oberlin College and Chicago Theological Seminary. The Congregationalists in America report over 741,000 communicants and about 6000 churches. The world membership is over 1,300,000.

Con'gress, the legislative branch of the Government of the United States, consisting of two houses, or chambers, a Senate and a House of Representatives, officially known as the Congress of the United States of America. Congress is not, however, as is generally presumed to be the case, modeled upon the British Parliament with its House of Lords and House of Commons, but was instituted by the Constitution which prescribes its membership and defines its powers, the two houses being the result of a compromise between the large and small states. The first plan provided for a Congress of only one branch and arranged for representation on the basis of population. The small states objected so vigorously to this that it was to preserve the weight and the dignity of the states among themselves that the Senate was instituted as a counterweight to the other branch of the legislative body. The duties of Congress as a lawmaking body are not only to pass laws but to judge the elections and qualifications of its members, to lay and collect taxes, duties and excises, to pay the debts and to provide for the common defense and general welfare of the people of the United States.

HOUSE OF REPRESENTATIVES. The Federal House of Representatives is descended through the state Houses of Representatives from the colonial assemblies and is not a permanent or continuing body, its entire membership being renewed every second year and the numerical strength being determined every ten years by the House itself. The first legislation on the subject was in 1790, when it was declared there should be 120 representatives. The national census was first taken in 1790 and an enumeration has been made every ten years since that time. Immediately after the publication of the census returns the House decides upon the number of members it shall contain for the ensuing ten years. This total is divided into the whole population of the country to determine the number of people who shall be entitled to one representative. The House of Representatives in the present Congress, according

to the reapportionment bill passed Aug. 3, 1911, consists of 435 members, Arizona and New Mexico having been admitted to statehood. Representatives must be at least 25 years of age and residents of the states in which they are chosen. They receive an annual salary of \$7500. The House of Representatives chooses its own presiding officer, called the speaker, from among its members.

THE SENATE. The Senate is composed of two senators from each state, chosen by the voters of the state for a term of six years. The senators are divided into three classes, so that one-third retire every two years, securing thus a continuing body. A senator must be 30 years of age, have been nine years a resident of the United States and an inhabitant of the state from which he is chosen. The salary is \$7500 a year and \$1800 a year additional for clerk hire. The vice-president presides over the Senate, which must approve the appointment of the higher officials made by the president. The Senate must also approve by a two-thirds vote treaties negotiated by the president with foreign powers, if they are to go into effect.

SESSIONS. The life of each Congress extends over a period of two years—the single term of service of a representative. There are, therefore, two regular sessions, called, by common consent, the long session and the short session. The long session begins the first Monday in December following the election and extends usually into the early summer. The short session begins on the first Monday of the following December and extends until noon on March 4 following, where it expires by limitation, as on that day the terms of all the representatives end. The president may call a special session if deemed necessary.

LAWMAKING. With the exception of bills for raising revenue, which must originate in the House of Representatives, any member of Congress has the right to introduce, in the branch to which he belongs, any measure which he wishes to have enacted into a law. To illustrate, a senator desires the enactment of a law

to improve the lighthouse service. He prepares the law and introduces it in the Senate. When introduced the measure is called a bill. The bill is read by the clerk and referred by the presiding officer to the committee having charge of the branch of legislation to which it belongs. The bill is then printed and in due time it is considered by this committee, before whom all arguments for or against its passage by outside parties must be presented. If the committee approves the bill, it is returned to the presiding officer's desk and put upon its passage. Members of the Senate now have opportunity to discuss the bill. If, when the vote is taken, a majority of the senators present approve, it is passed by that body. The bill is then sent to the House, where it is introduced by the proper officer as coming from the Senate. It is then referred to the proper committee in the House and takes the same course as in the Senate. If a majority of the representatives present approve the bill when the vote is taken, it passes that body and is sent to the president. If he approves, he signs the bill and it becomes a law. When the Senate and House fail to agree on an important bill, it is usually referred to a conference committee consisting of members from each body appointed by their respective presiding officers, and the agreement reached by this committee is usually accepted. When the president does not approve a bill, he returns it to the House in which it originated, with his veto, which is a message stating his objections. The bill may again be put upon its passage, and if it receives the approval of two-thirds the members in each house, it becomes a law without the president's signature. The president is required to sign or veto a bill within ten days, or it becomes a law without his signature, unless Congress adjourns before the expiration of the ten days.

Congress, Continental, the Congress of the American colonies which assembled in Philadelphia in September, 1774. It adopted a declaration of rights which it sent, with a petition to Parliament and

the King, and appointed a time for the meeting of a second Congress if the grievances had not been righted. It was attended by 55 delegates from 12 colonies. This Congress was called Continental to distinguish it from the provincial congresses held in several of the colonies at about the same time, and the word *continental* was convenient for distinguishing between the whole confederacy and its various members. Such authority as this Congress had arose from the fact that it represented an agreement on the part of the several governments to hold to a certain line of policy. It was executive, but could hardly be called a legislative body; nevertheless it was the symbol of a kind of union between the states, as there never was a time when anyone of the original states exercised singly the full power of government; collectively, however, the measures adopted by this Congress have been called the first enactment of general law in America.

Congreve, Kon' grave, William (1670-1729), an English dramatist, born in Bardsey. His sustained flow of wit made him the master of pure comedy of the highest type, but morally he was not sound, for his work was too closely related to the drama of the Restoration. His plays include the *Way of the World* (his masterpiece), *The Old Bachelor*, *The Double-Dealer*, *Love for Love* and *The Mourning Bride*.

Co'nifer, one of the largest families of trees and shrubs, and represented in all but tropical zones. The trees are very similar, having straight, cylindrical stems, scaly or fibrous bark and needlelike leaves. In all but two groups the leaves are evergreen. The flowers are without sepals or petals and are always of two kinds: the staminate, or those which are to produce the fertilizing dust, are borne in catkins; the pistillate, which develop into the fruit, are protected by scales, and in ripening form the cones from which the family derives its name conifer, or cone-bearing. Most trees of this family are tall and their tops form a narrow inverted cone. In forests the

branches commonly grow high on the trunk, leaving straight, naked stems valuable for poles and masts. The best-known conifers are the pines, balsams, yews, firs, junipers, cedars, tamaracks and sequoias. Many of these are valuable for their lumber, others for the production of resins, pitch, turpentine and tar; others produce medicine. The sequoias are remarkable for their size.

Conk'ling, Roscoe (1829-1888), an American statesman, born in Albany, N. Y. He was admitted to the bar in 1850, and the same year became district attorney for Oneida County. In 1858 he was elected mayor of Utica, and the next year entered the lower house of Congress, where he served until 1863, and again from 1865 to 1867, when he became United States senator. He was reelected to the Senate in 1873 and again in 1879. In the Senate he was connected with nearly all the leading committees. He was a zealous supporter of President Grant's administration, but because of differences with President Garfield in regard to Federal appointments both he and his colleague, Senator Platt, resigned and sought reelection in the State Legislature, but were unsuccessful. Conkling then returned to New York City and continued his law practice during the remainder of his life.

Connaught, Kon' nat, and Strathearn, Arthur William Patrick, DUKE OF (1850-), governor-general of Canada, the third son of Queen Victoria and Prince Albert, born at Buckingham Palace, London. He was educated privately and at the Royal Military Academy, Woolwich, and in 1879 he married Princess Louise, daughter of Prince Frederick of Prussia. Having entered the army as lieutenant in 1868, he became field marshal in 1902, in the meanwhile serving during the Fenian Raid, 1870, and in Egypt, 1882, where he was present at the action of Mahuta and Tel-el-Kebir. Moreover, he commanded at Meerut, India, in 1885-1886; was commander-in-chief in Ireland in 1900; four years later became inspector-general; and subsequently was commander-in-chief in the

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Mediterranean, retiring from the army in 1909. In succession to Earl Grey, the Duke was appointed governor-general of Canada in 1911. He was created Duke of Connaught and Strathearn and Earl of Sussex in 1874, and in 1900 he renounced his claim to the Duchy of Saxe-Cobourg and Gotha.

Conneaut, *Kon' e aut'*, Ohio, city and subport of entry of Ashtabula Co., 68 m. n.e. of Cleveland, on Lake Erie at the mouth of Conneaut Creek and on the Lake Shore & Michigan Southern, the Bessemer & Lake Erie and the New York, Chicago & St. Louis railroads. There is also car-ferry connection with Port Stanley and Rondeau on the Canadian side of Lake Erie. There is a fine harbor. The city is situated in a dairying and agricultural region, and farm products, coal and ore are extensively shipped. Conneaut contains good municipal buildings, numerous churches and a beautiful park on the lake shore. There is an excellent system of schools. The city has flour and planing mills, tanneries, brickworks, nickel- and tin-plate works, canneries, railroad repair shops and manufacturing of gas and electric fixtures and electric and gas lamps. The first permanent settlement was made in 1798, though surveyors for the Connecticut Land Company had built a log storehouse here in 1796. Conneaut was incorporated in 1832 and granted a city charter in 1898. Population in 1920, 9,343.

Connecticut, *Ko net' i kut'*, THE LAND OF STEADY HABITS, or *The Nutmeg State*, one of the New England States, is bounded on the n. by Massachusetts, on the e. by Rhode Island, on the s. by Long Island Sound and on the w. by New York. The state is nearly rectangular in form.

SIZE. The length from east to west is 95 m. The average width is 55 m. and the area is 4965 sq. m., of which 145 sq. m. are water. Connecticut is a little over one-half the size of Massachusetts and is the third smallest state in the Union.

POPULATION. In 1920 the population was 1,380,631. Between 1910 and 1920 there was a gain in population of 265,-

875, or 23.9 per cent. There were 286.4 inhabitants to the sq. m. The state's rank in population is 29.

SURFACE. The western part of the state is crossed by ranges of the Berkshire Hills, which enter Connecticut from Massachusetts. It is diversified by hill and valley. The highest elevation is Bear Mountain, 2354 ft. Other mountains of note are Gridley, Riga, Bradford, Dutton and Ball. East of these ranges of hills is the Connecticut Valley, occupying the central part of the state, and east of this valley and separated from it by a range of low hills is the Valley of the Thames. The entire state is a general slope to the south and the surface is generally hilly and rugged. The land along the coast is low and level.

RIVERS. Connecticut is crossed by three river systems: the Thames, formed by the Natchaug and the Quinebaug; the Connecticut in the center and the Housatonic in the west. The chief tributaries of the Housatonic are the Naugatuck and the Shepaug. All these streams flow into Long Island Sound. The estuaries at the mouth of the Connecticut and the Thames form good harbors.

CLIMATE. The climate is changeable, with moderately cool winters and hot summers. The rainfall is sufficient for agriculture. During the winter snow is common on the hills and deep among the mountains. The climate is generally healthful; autumn is the most attractive season.

MINERALS AND MINING. Brown sandstone, valuable for building purposes, is quarried near Middletown. The state also contains deposits of iron and the mines at Salisbury have been worked for more than a century. When compared with the production of iron in the ore-producing states the output of these mines is small. They are, nevertheless, of great historic interest, for from them came much of the iron that was converted into cannon balls, camp kettles and other articles used in the Revolutionary War by the American forces. Marble is quarried and a variety of limestone is used in manufacturing lime and cement.

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AGRICULTURE. Agriculture is the second industry in importance in the state. The soil is generally fertile, but the best crops are produced in the Connecticut Valley. The leading field crops are hay, corn, oats, rye and potatoes. Tobacco is raised in large quantities, most of it being grown under a protection of muslin, which is stretched over frames and elevated a few feet above the plants. Dairy husbandry is important and the raising of poultry and garden vegetables for the markets in New York and other cities is profitable.

MANUFACTURES. Manufacturing is the chief industry of the state and some of the industries date from colonial times. The manufacture of tinware began in Berlin in 1770. Clocks and watches were made about 1773 and 20 years later the manufacture of timepieces had become a thriving industry. The manufacture of sewing machines on a large scale was begun at Bridgeport by Elias Howe.

Connecticut has a variety of manufactures. Within the state are made 60 per cent of the clocks, 75 per cent of the ammunition, nearly 50 per cent of the hardware, 75 per cent of the plated ware and 65 per cent of all the needles and pins manufactured in the United States. The manufacture of cotton and woolen goods, rubber goods, silks, machinery, buttons and numerous small wares has also attained large proportions. At New London are shipyards where some of the largest ocean steamships have been constructed.

The thriving manufacturing industries of Connecticut are due to her abundant water power and proximity to markets and more than all else to the native ingenuity of her people. In proportion to her population Connecticut has more patents to her credit than any other state in the Union.

TRANSPORTATION AND COMMERCE. The state contains over 4500 m. of railway. Most of the lines are under the control of the New York, New Haven & Hartford system. The Central Vermont has its southern terminus at New London.

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Numerous electric lines extend north and south and east and west, so that all places in the state are within easy reach of railroad communication. New London, New Hartford and Bridgeport have steamer connection with New York and Boston.

The state is near the great markets of New York and Boston and carries on a thriving commerce. Her manufactures are widely distributed over the country and also find their way to foreign lands. Raw material for manufacturing, foodstuffs and some manufactures are imported.

GOVERNMENT. Connecticut has the honor of having framed and ratified the first written constitution in America. This was adopted in 1639 and continued in force until 1818, when the present constitution went into effect.

The executive department consists of the governor, lieutenant-governor, secretary of state, treasurer and controller, elected by the people for two years. Minor state officers are appointed by the governor. The General Assembly consists of the Senate, of 24 members, and the House of Representatives, of 255 members, all elected for two years.

The judicial department consists of the Supreme Court of Errors, a Superior Court, a Court of Common Pleas and a District Court. The judges of these courts are nominated by the governor and confirmed by the General Assembly. The state is divided into 112 probate districts and the judges of these are elected by the people. Local judges of cities and boroughs are appointed by the General Assembly.

EDUCATION. A good system of public schools is maintained. In some parts of the state the district system is still in vogue, but in other parts the township is the unit of administration. Cities and villages maintain efficient grade and high schools. Revenue is derived from a state fund and from local taxation. State normal schools are maintained at New Britain, Danbury, New Haven and Willimantic.

The leading educational institutions not

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under the control of the State are Yale University (See **YALE UNIVERSITY**), at New Haven; Wesleyan University, at Middletown; Trinity College; the Hartford Theological Seminary, at Hartford; and the St. Thomas and St. Joseph Catholic seminaries.

STATE INSTITUTIONS. The hospital for the insane is at Middletown, the school for the feeble-minded and the institutions for the deaf and blind are at Lakeville. The state prison is at Wethersfield, the industrial school for girls is at Middletown and that for boys at Meriden.

CITIES. The chief cities are Hartford, the capital; New Haven, Bridgeport, Waterbury and New London.

HISTORY. Connecticut was named from the river of that name, the Algonquin "long river." An original grant of the Plymouth Company in 1606, the territory was explored by the Dutch in 1614, who established a fort at Hartford in 1633. Previously, in 1631, the English Lord Say and Sele had been granted a tract from Narragansett Bay to the Pacific Ocean, soon settling Saybrook. In 1633 fur traders from Plymouth established Windsor, to which place Thomas Hooker and his congregation later came. By 1637 Puritans settled in New Haven, a place to "be ordered by those rules which the Scripture holds forth." In 1662 the settlements of Connecticut and New Haven, both of which had prospered, were united.

In the fight for the charters, Connecticut was tenacious, hiding for two years in "Charter Oak" the document which, in 1687, Governor Andros demanded. Connecticut's Israel Putnam figured prominently in the French and Indian War as did he, with Roger Sherman and Gov. Jonathan Trumbull, in the Revolutionary struggle, to which the state sent about 30,000 soldiers. "Brother Jonathan" was intimate with Washington. The last of the raids against Connecticut's unprotected towns was in charge of Benedict Arnold, September, 1781.

At the Constitutional Convention, its representatives, Sherman, Johnson and

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Ellsworth, proposed our present proportional system of representation. The state opposed the War of 1812, was the seat of the Hartford Convention (See **HARTFORD CONVENTION**), and, later, opposed slavery. Its war governor, Buckingham, was prominent. At first Hartford and New Haven were capitals, but Hartford became the sole seat of government in 1873. Consult Johnston's *Connecticut* in *American Commonwealths Series*.

GOVERNORS. Jonathan Trumbull, 1776-1784; Matthew Griswold, 1784-1786; Samuel Huntington, 1786-1796; Oliver Wolcott, 1796-1797; Jonathan Trumbull, 1797-1809; John Treadwell, 1809-1811; Roger Griswold, 1811-1812; John Cotton Smith, 1812-1817; Oliver Wolcott, 1817-1827; Gideon Tomlinson, 1827-1831; John S. Peters, 1831-1833; Henry W. Edwards, 1833-1834; Samuel A. Foote, 1834-1835; Henry W. Edwards, 1835-1838; William W. Ellsworth, 1838-1842; Chauncey F. Cleveland, 1842-1844; Roger S. Baldwin, 1844-1846; Isaac Toucey, 1846-1847; Clark Bissell, 1847-1849; Joseph Trumbull, 1849-1850; Thomas H. Seymour, 1850-1853; Charles H. Pond, 1853-1854; Henry Dutton, 1854-1855; William T. Miner, 1855-1857; Alexander H. Holley, 1857-1858; William A. Buckingham, 1858-1866; Joseph R. Hawley, 1866-1867; James E. English, 1867-1869; Marshall Jewell, 1869-1870; James E. English, 1870-1871; Marshall Jewell, 1871-1873; Charles R. Ingersoll, 1873-1877; Richard D. Hubbard, 1877-1879; Charles B. Andrews, 1879-1881; Hobart B. Bigelow, 1881-1883; Thomas M. Waller, 1883-1885; Henry B. Harrison, 1885-1887; Phineas C. Lounsbury, 1887-1889; Morgan C. Bulkeley, 1889-1893; Luzon B. Morris, 1893-1895; O. Vincent Coffin, 1895-1897; Lorrin A. Cooke, 1897-1899; George E. Lounsbury, 1899-1901; George P. McLean, 1901-1903; Abiram Chamberlain, 1903-1905; Henry Roberts, 1905-1907; Rollin S. Woodruff, 1907-09; Geo. L. Lilley, 1909; F. W. Weeks, 1909-11; S. E. Baldwin, 1911-15; M. H. Holcomb, 1915-19; E. J. Lake, 1919—.

Connecticut, Fundamental Orders of, a constitution adopted at Hartford, Conn., in 1639, by the assembled freemen from the towns of Windsor, Hartford and Wethersfield. According to the *Orders*, the three towns were to be one "public state of commonwealth," having two general assemblies yearly, at the first of which the governor, an enforced church member, and six magistrates were to be selected. In default of specific rules, they were to administer justice according to the word of God. Furthermore, all were freemen who had pledged allegiance to the colony; the governor's term was two years, and to the assemblies, which comprised delegates from the several towns, was reserved the right to pass laws for controlling the colony. By the entire body of freemen taxes were levied, freemen were admitted, public land was disposed of and officers were impeached. This remarkable work was probably drawn up by Thomas Hooker. It marks the start of American democracy and is "the oldest truly political constitution in America."

Connecticut Reserve. See WESTERN RESERVE.

Connecticut River, the largest river of the New England States, rising by several branches in northern New Hampshire near the Vermont boundary. It flows southwest, separating Vermont from New Hampshire, crosses Massachusetts and Connecticut and enters Long Island Sound 30 m. e. of New Haven. It is 400 m. long and drains an area of fully 11,000 sq. m. Navigation has been improved by means of locks and canals so that large steamboats ascend it to Hartford and smaller ones to Holyoke. The Connecticut Valley is fertile and is a region of varied beauty, with rolling hills, broad plains, high cliffs and near-by mountains. Its chief tributaries are the White, Passumpsic, Deerfield, Farmington, Westfield, Miller, Chicopee and Ammonoosic. The cities of Brattleboro, Vt., Springfield, Holyoke and Northampton, Mass., and Hartford and Middletown, Conn., lie upon its banks.

Connellsville, Pa., a city of Fayette Co., 57 m. s.e. of Pittsburgh, on the Youghiogheny River, opposite New Haven, on the Baltimore & Ohio and the Pennsylvania railroads and at the base of the Chestnut Ridge Mountain. The city has fine municipal buildings and is the seat of a state hospital for miners. Connellsville is the center of the coke region, and the most important place of coke production in the United States. The other industries include tin-plate and automobile works, steam-pump factories, mine-car shops, etc. The town was settled in 1770 and named in honor of Zachariah Connell, the founder. It was incorporated in 1806. Population in 1920, U. S. Census, 13,804.

Connersville, Ind., a city and county seat of Fayette Co., 57 m. s.e. of Indianapolis and 22 m. s.w. of Richmond, on the Whitewater River and on the Cincinnati, Hamilton & Dayton, the Cleveland, Cincinnati, Chicago & St. Louis and other railroads. It is situated in an agricultural region. Important industries are the manufacture of flour, axles, rotary blowers and furniture. Located here are very large factories for the manufacture of automobiles and automobile tops. The town was incorporated in 1813. Population in 1920, 9,901.

Con'nor, Ralph. See GORDON, CHARLES WILLIAM.

Con'serva'tion, the name given a popular movement which began with a conference of governors called by President Roosevelt to meet in Washington in May, 1908, and having for its purpose the preservation for the people of the natural resources still under control of the National Government. As a result of this conference the President appointed a national conservation commission. The governors also appointed commissioners in their respective states. The conference formulated and adopted certain articles of agreement concerning the conservation of our national resources, among which are the following, which set forth the purpose of the movement.

"We agree that the land should be so

used that erosion and soil-wash shall cease; that there should be reclamation of arid and semiarid regions by means of irrigation, and of swamp and overflowed regions by means of drainage, that the waters should be so conserved and used as to promote navigation, to enable the arid regions to be reclaimed by irrigation, and to develop power in the interests of the people; that the forests which regulate our rivers, support our industries, and promote the fertility and productiveness of the soil should be preserved and perpetuated; that the minerals found so abundantly beneath the surface should be so used as to prolong their utility; that the beauty, healthfulness and habitability of our country should be preserved and increased; that the sources of national wealth exist for the benefit of the People, and that monopoly thereof should not be tolerated.

"We declare our firm conviction that this conservation of our natural resources is a subject of transcendent importance, which should engage unremittingly the attention of the Nation, the States and the People in earnest cooperation.

"We agree that this cooperation should find expression in suitable action by the Congress and by the legislatures of the several States."

THE NATIONAL COMMISSION. The first work of the national commission was the preparation of an inventory of the natural resources of the United States, including Alaska. At a joint conference of the national and state commissions held in Washington in December, 1908, this report was discussed, and in January, 1909, it was transmitted to Congress with a message from the President signifying its approval. This conference also authorized President Roosevelt to invite Canada and Mexico to join the United States in taking an inventory of the natural resources of North America. These invitations were accepted, and a joint meeting of the commissions from the three countries was held in Washington in February, 1909. This meeting was called the North American Conservation Conference. Among other things

this conference recommended calling a world-wide conference, and the President sent invitations to the various nations to unite in such a conference to be held at The Hague at a date which might be agreed upon. However, the conference was not held.

NATIONAL CONSERVATION ASSOCIATION. The Sixtieth Congress refused to continue the appropriation for the national commission. In July, 1909, the National Conservation Association was organized, with Dr. Charles W. Eliot, president emeritus of Harvard University, as its first president. This association maintains offices in Washington, and is sustained by membership dues and voluntary contributions. Under its auspices a National Conservation Congress is held each year, at which there are a large number of representatives from all parts of the country. The conference of 1909 was held in Seattle, Wash.; that of 1910 in St. Paul, Minn.; and that of 1911 in Kansas City, Mo.

The end and aim of these organizations is to secure the preservation from waste and from the control of syndicates the natural resources in streams, in forests and in minerals, and to encourage scientific farming so as to stop the waste of soils. See FORESTRY; IRRIGATION.

Conserv'atory. See GREENHOUSE.

Conshohocken, *Kon"sho hok'en*, Pa., a city of Montgomery Co., 13 m. n.w. of Philadelphia and 3 m. below Norristown, on the Schuylkill River and on the Philadelphia & Reading and the Pennsylvania railroads. It is connected with West Conshohocken by bridge. The more important industrial establishments include rolling and steel mills, furnaces, foundries, surgical-implement works, cotton and woolen mills and rubber goods manufacturing. Conshohocken was settled in 1830 and incorporated in 1852. Population in 1920, 8,481.

Conspir'acy, in law, "a combination of two or more persons by some concerted action to accomplish an unlawful purpose, or to accomplish a purpose not in itself unlawful by unlawful means." A conspiracy is a criminal act. Accord-

ing to English law the agreement itself is a criminal act, and no overt act is necessary to the completion of the crime. In the United States, however, the act agreed upon must be performed to complete the crime.

Constable, Kun' sta b'l, John (1776-1837), an English landscape painter, born at East Bergholt in Suffolk, the son of a prosperous mill owner. In 1799, after sundry efforts at drawing, he entered the Royal Academy as a student, where he received the encouragement of Benjamin West. He was strongly influenced by Reynolds and Hoppner, whose portraits he copied, and also by Gainsborough and the Dutch masters. Constable was one of the greatest landscape painters that ever lived. In his power to express tone, color, movement and atmosphere he was without rival. His finest work includes *Flatford Mill, A Cottage in a Cornfield, The White Horse, Stratford Mill, The Lock, The Haywain*, awarded a gold medal at the Louvre, *A View of the Stour*, and the *Leaping Horse*, by many considered his masterpiece.

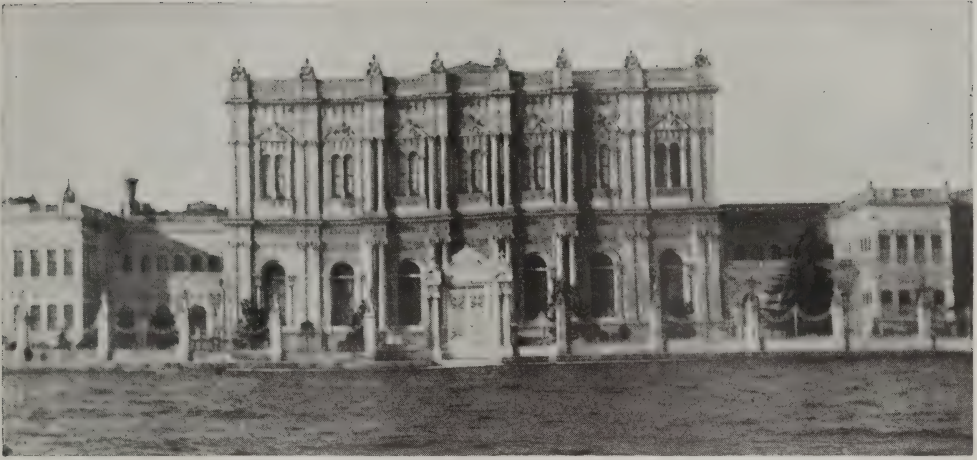
Con'stance, Lake, a lake of glacial origin in central Europe, forming a part of the boundary line between Switzerland and Austria on the south, and Baden, Württemberg and Bavaria on the north. It is situated at the north base of the Alps, and is about 40 m. long, having an area of 208 sq. m., with a maximum depth of 906 ft. To the north it forks into a branch called Ueberlingen See, and its southern extremity is known as Zeller See. It receives the Rhine from the south; several minor streams also discharge into the lake. There are 26 varieties of fish in its waters, including salmon and salmon trout. The surrounding shores are hilly, fertile and picturesque, and are under cultivation except where the woodlands prevail. On its shores are the towns of Lindau, Ueberlingen, Constance, Arbon and Bregenz.

Con'stantine the Great (about 272-337), Emperor of Rome. His father was raised to the rank of Cæsar and placed over the Western provinces. As a boy Constantine was a hostage at the Eastern

court. When his father died his soldiers greeted Constantine as Augustus. He was cautious enough not to assume this title at first, but by 324 he had overcome all his rivals. He presided at the Council of Nicæa in 325 and the next year determined upon the removal of the capital from Rome to the East. He adopted the Christian religion and after he became sole ruler he made it the religion of the State. His laws show a desire for reform, with distinct traces of Christianity when they deal with such questions as the treatment of slaves and prisoners. The year 337, while preparing to fight the King of Persia, he was taken ill and died. He was buried in the Church of the Apostles at Constantinople.

Constan'tino'ple, the capital of the Turkish Empire, situated in the extreme southeastern part of European Turkey, on the Bay of Bosphorus and the Sea of Marmora. Like Rome, it extends over seven hills, and the site, as well as the distinctive architecture of the city, affords a magnificent spectacle from the sea. The location, chosen by Constantine, constitutes a natural citadel with the unique surrounding transfigurations of land and sea,—an ideal place to establish a great and splendid empire and to build up a city, the rival of Athens, Jerusalem and Rome. It commands the waterway between the Mediterranean and the Black Sea, and has possessed great commercial and political importance. Surrounded by water on all sides except the west, it is there protected by a high double wall, four miles in length.

STREETS AND PUBLIC BUILDINGS. The streets are narrow and crooked, and there are no sidewalks. The houses are chiefly one story in height, and only within recent years has fireproof building material taken place of wood. First in importance among the buildings the famous Church of St. Sophia. The exterior appearance of the edifice is disappointing and not in harmony with the grandeur of the inside, which has been executed with unparalleled grace, harmony, lightness and proportion. The building is crowned with a dome rising



Palace of Dolma Bagtche at Constantinople. Abdul Medjid, the new religious leader of Mohammedanism, went into seclusion here until his whiskers reached the length required by the rules of the Faith.



MADE GOVERNOR OF CONSTANTINOPLE.

Received with great pomp and ceremony, Rafet Pasha and aides on his arrival in the Turkish capital, went to the mosque of St. Sofia, and prayed. Rafet Pasha, third from the left, is shown surrounded by Kemalist officials.



IN MOSUL

A typical street scene of Mesopotamian cities. Coffee house and bazaar in the center of rich oil fields. Great Britain and Turkey broke up the Lausanne conference by their dispute over this historic town on the Tigris.

180 ft. above the ground, a crescent taking the place of the golden cross at the top, after the Turkish conquest. Other adaptations to suit Moslem worship were effected, chief of which was the addition of a minaret at each of the four exterior angles of the building, and the covering of the beautiful mosaics on the interior walls with inscriptions from the Koran. It is a triumph of Byzantine art and the most beautiful ecclesiastical building in the world. Among other edifices are the Mosque of Solyman, various other mosques, the Castle of the Seven Towers (formerly a state prison), several royal palaces, the custom-house, bazaars, including the Great Bazaar, and warehouses. The Hippodrome was the scene of public festivals and the center of the political life of the city. It contained the famous chariot race-course completed by Constantine. The aspect of the city, subjected to modern changes, is constantly changing and Constantinople is losing much of its Oriental character. There are good schools and colleges and several foreign educational institutions.

COMMERCE AND INDUSTRIES. Since 1888 railway connections with the rest of the world have been established. The natural harbor facilities are unsurpassed, the harbor, the Golden Horn, having dock provisions for the unloading of over 1000 vessels. The imports include corn, timber, food products, textiles, petroleum, implements and wood. The chief exports are carpets, rugs, wool, lamb-skins, filigree work and attar of roses. Embroideries are sold to tourists, and large quantities of the sweetmeat called "Turkish delight" are shipped. Aside from the handmade products the only manufactures are those of ironwares, tobacco products and fezzes.

GOVERNMENT AND HISTORY. The city is divided into four divisions controlled by a minister of police, the municipal affairs being in the hands of a prefect appointed by the sultan. He is assisted by a council of 24 members. Constantinople was built on the ancient site of Byzantium, and in 330 A. D. the Emperor Constantine changed the name of his new

capital to its present name. It became preeminently the capital of Greek civilization. It was seized by the Crusaders in 1203 and 1204; after its capture by the Turks in 1453 a new epoch in European history began, for the fleeing scholars brought to Europe, their new home, all the learning of the East and thus furthered extensively the cause of the Renaissance and the Reformation. The inhabitants are of many nations, races, language and conflicting faiths. Population, including the suburbs, estimated at 1,100,000.

Con"stella'tions, groups of stars occupying clearly defined portions of the celestial sphere and known by specific names. The stars are unevenly distributed and form well-defined clusters in various parts of the heavens. The ancients set their mythical deities and heroes in the skies "and read the revolving pictures as a starry poem." This method of naming the constellations originated so near the dawn of history that its origin is unknown. Job speaks of the Pleiades and Orion, and, at a very early date, the Arabs knew the Great Bear. Through the time of the Greeks and Romans and the Middle Ages, mythology and that part of astronomy that referred to the stars were hopelessly mixed. When astronomers began to make maps of the heavens, they peopled their charts with pictures of gods and goddesses, beasts of the field and forest and monsters of the deep, and these figures so obscured the stars forming the constellation that they were not easily found. Now star maps join the principal stars in a constellation by straight lines, forming geometrical figures which can be easily traced. Modern astronomies and some educational and scientific journals contain star maps for the different months of the year. With little practice anyone can readily find the leading constellations. Besides those of the zodiac (See ZODIAC), the most prominent constellations are Ursa Major, or the Great Bear; Bootes, the Bear Driver; Cassiopeia; Draco, the Dragon; Orion; Pegasus;

CONSTITUTION

the Hunting Dogs; and Andromeda. See STARS.

Con'stitu'tion, the fundamental law of a country, state or other organized body, but the term ordinarily applies to the organic law of a state or nation. Constitutions may be written, as that of the United States, or unwritten, as that of Great Britain. According to their origin, constitutions are of three classes: (1) those framed and adopted by a sovereign people, as the Constitution of the United States, and those of the several states of the Union; (2) those formed by contracts between a nation and an individual whom the nation accepts as a sovereign, as the constitutions of most limited monarchies; (3) those which are contracts between different sovereign powers, which agree to combine to form a central government, as in the formation of the German Empire. The constitutions of the United Provinces of Holland and of the Swiss Confederation also belong to this class. The constitution of Great Britain is the best illustration of an ordinary (or flexible) constitution. It is derived from the following sources: (a) Magna Charta, of 1215; (b) the Declaration of Rights, 1689; (c) the Act of Settlement, 1701; (d) the Union with Scotland, 1707; (e) the Union with Ireland, 1800; (f) a large number of acts of Parliament; (g) a body of precedents and customs, known as common law; (h) usages and practices known as customs of the constitution. These various parts of the constitution are nowhere brought together in one body, and the constitution may be modified by act of Parliament or judicial decision. The constitutions of the British colonies are based on that of the Mother Country. See AUSTRALIA, COMMONWEALTH OF, subhead *Government*; CANADA, DOMINION OF; SOUTH AFRICA, UNION OF.

Constitutions like those of the United States are known as extraordinary, or inflexible, because they cannot be modified except in accordance with provisions which the Constitution contains; to illustrate, from 1803, when an amendment changing the method of electing presi-

CONSTITUTION OF THE U. S.

dent and vice-president was adopted, there were no amendments to the Constitution of the United States until 1865, when the issues of the Civil War made further amendments necessary. From 1865 until 1912 no amendments were presented to the states. In that year Congress passed and referred to the states for adoption an amendment providing for the election of United States senators by a direct vote of the people, and one providing for the legalizing of an income-tax law. See CONSTITUTION OF THE UNITED STATES; GOVERNMENT; LAW; MAGNA CHARTA.

Constitutional Union Party. See POLITICAL PARTIES IN THE UNITED STATES, subhead *Constitutional Union Party*.

Constitution of the United States, the supreme law of the United States of America, to which the national and state governments are required to conform. The Constitution was the final outgrowth of several attempts of the English colonies in America to form a union. The first of these attempts was the union of the New England colonies in 1643. This union was local and of little significance. The second attempt was at the Albany Convention in 1754 (See ALBANY CONVENTIONS), and the third was the adoption of the Articles of Confederation during the Revolutionary War. See CONFEDERATION, ARTICLES OF.

At the close of the Revolutionary War the United States, though having gained her independence, was in a deplorable condition. The nation was without credit at home and abroad; her commerce and manufactures were practically destroyed; the Congress was merely an advisory body; and the states were jealous of each other and antagonistic in their commercial relations.

The first direct step which led to the formation of the Constitution was a convention called in 1785 to settle a commercial difficulty between Maryland and Virginia. This led to calling a convention to meet at Annapolis the following year to revise the Articles of Confedera-

tion so as to give Congress control of commerce. This convention recommended Congress to call a convention to meet at Philadelphia in 1787, with more extended powers. See ANNAPOLIS CONVENTION.

CONSTITUTIONAL CONVENTION. The convention which framed the Constitution met in Independence Hall, Philadelphia, May 25, 1787, and organized by electing George Washington president and William Jackson secretary. All states except Rhode Island were represented, though some were not fully in sympathy with the movement. The convention sat with closed doors, and completed its work in four months, adjourning Sept. 17, 1787.

COMPROMISES. The Constitution contained three great compromises. The first one settled the controversy between those who wanted a strong Federal government and those who feared such a government. This compromise was effected by clothing the chief executive with sufficient authority but limiting his term of office. The second was in regard to slavery and was removed by the Thirteenth, Fourteenth and Fifteenth amendments. The third was to satisfy the demands of the large and small states, and consisted in providing that all states should be represented in the lower house of Congress, according to population, and that each state should have two representatives in the upper house. See CONGRESS, subheads *House of Representatives* and *Senate*.

DEPARTMENTS OF GOVERNMENT. The Constitution of the United States is unique in that it provides for three coordinate departments of government: the legislative (See CONGRESS), the executive (See PRESIDENT) and the judiciary (See COURT; SUPREME COURT).

AMENDMENTS. The Constitution may be amended in two ways: "the Congress, whenever two-thirds of both houses shall deem it necessary, shall propose amendments to this Constitution, or, on the application of the Legislatures of two-thirds of the states, shall call a convention for proposing amendments."

Whenever amendments are proposed they must be ratified by the Legislatures of three-fourths of the states or by conventions in three-fourths of the states called for that purpose. The first ten amendments were proposed by the First Congress and embody what is practically a bill of rights. The Eleventh and Twelfth amendments soon followed. Then there were no further amendments until the close of the Civil War in 1865, when the Thirteenth, Fourteenth and Fifteenth were adopted. The Sixteenth Amendment, making Federal income taxes constitutional, was adopted by Congress in 1909; the Seventeenth Amendment, providing for the direct election of United States senators, was adopted by Congress in 1912. Both of these amendments were ratified by the requisite number of states in 1913, and became a part of the Constitution. See UNITED STATES, subhead *Government*.

Constitution, The, a battleship, probably the most famous in the history of the United States navy. The *Constitution* was a frigate of 1576 tons, carrying 52 guns, built and launched at Boston in 1797, and unsurpassed at that time. During the war with Tripoli she was the flagship of Commander Preble. In 1804-5 she was in Commander Barrow's squadron. The treaty of peace with Tripoli was signed on board this vessel, in June, 1805. In 1806 she returned to the United States. At the beginning of the War of 1812, commanded by Isaac Hull, the *Constitution* escaped a British squadron, which was considered to be one of the notable feats of the war, and on Aug. 19 of the same year she defeated the British frigate *Guerriere*. The following Dec. 29 she captured the British frigate *Java*, and in 1815, the *Levant*. A proposal to dismantle her in 1828 called forth the stirring poem *Old Ironsides* of Oliver Wendell Holmes, which saved the historic boat from destruction. She was rebuilt in 1833 and again in 1877, and can now be seen in the Boston navy yard, where she was placed in 1897.

Con'sul. See DIPLO'MACY, subhead *Consul*.

Consump'tion, in political economy the use of wealth for satisfying human wants. Consumption may or may not be accompanied by a change of form in the material used. Forage fed to stock for the purpose of producing beef or milk is destroyed as forage, that is, its form is changed. A farm wagon is worn out by long usage, but its form is not changed. Its value, however, is decreased. Destruction is not consumption because no human want is satisfied. For instance, a large area may be denuded of its forests and the trees manufactured into lumber. Another equal area may be denuded by forest fires. The first is consumption; the second, destruction. Consumption is classified as productive and final. It is productive when the commodity is used in the production of some other commodity, as in changing logs into wood pulp and the pulp into paper. Final consumption is that which has for its direct purpose the satisfying of a want, as the wearing out of clothing and the consumption of food.

Consumption. See TUBERCULOSIS.

Contempt', refusal to obey the order of a court, or disrespectful or disorderly conduct in any court or legislative body. All courts have power to punish one for contempt, because the act of the offender tends to lower the dignity and impair the power of the court. The punishment may consist of fine or imprisonment, or both. The court likewise has the power to forgive the offender, provided he make suitable apology and make pecuniary reparation for any financial loss that his act may have occasioned.

Con'tinen'tal Money. At the outbreak of the Revolutionary War, the Continental Congress had no means of securing funds except by requisitions upon the several states, and these did not always meet with a prompt response. In such straits the Congress began in June, 1775, to issue paper currency, which was known as continental money. This action was doubtless influenced also by the prevalent theory that paper money repre-

sented real wealth. Over \$242,000,000 had been put into circulation up to March, 1781, when further issues were discontinued. After the first year this continental money began to depreciate, in spite of enactments of Congress that it should pass at par and charges of lack of patriotism against those who refused so to accept it. By the end of 1779 it was worth only two and one-half cents on the dollar. In March, 1780, Congress passed an act retiring these issues at the market value, or replacing them with "new tenor" notes at 20 to 1, bearing five per cent interest. The old notes finally dropped to 1000 to 1 and then ceased to circulate altogether. In 1843 the amount of continental money never redeemed was stated at \$73,000,000. See FIAT MONEY; MONEY, subhead *Paper Money*.

Con'tract, in law, an agreement between two or more persons in which each party agrees to perform, or not to perform, a certain specified act, or acts; and by which each party acquires a legal right to what the other promises. In making a contract there are two distinct acts. A makes an offer; B accepts it. The offer may be expressed (1) by an action which a reasonable person would understand to mean a certain definite thing, (2) by word of mouth, or (3) in writing. The acceptance may be by word or by action. Under statute law, however, the offer and acceptance must be in writing. If the acceptance be not given directly to A, it must be delivered to the usual carriers of communication, such as the mail or telegraph, before the expiration of that time limit, if any, upon which A and B have previously agreed. If B's reply covers the specific proposition made by A, it then constitutes an acceptance, and the contract is made. Certain contracts, however, must be both signed and sealed by the contracting parties.

In certain cases, love and affection between near relatives constitute sufficient consideration, but the promise of a gift for no compensation cannot be enforced at law. In general, therefore, every con-

tract must be founded upon a consideration of money or of some act whereby advantage accrues to both parties. Contracts cannot be enforced if obtained by fraud, mistake or compulsion. They are void when the consideration is impossible of fulfillment or when their subject matter is illegal, as, for example, in violation of certain statutes, such as those against betting and gambling; or when they are contrary to public policy, or would, if carried out, obstruct the cause of justice, compel the performance of an immoral act, or a crime.

There are certain disabilities which prevent the making of contracts: (1) They are illegal and void if made between citizens of two countries which are at war. (2) Contracts made by a lunatic or by a drunkard are void if his condition was known to the other contracting party. (3) Under the common law, one under 21 years of age cannot make a valid contract unless it is for his special benefit, as, for example, for the necessities of life. (4) Under the common law a married woman cannot make a legal contract; but the relation of husband and wife also affects the husband in the case of certain contracts. Under the statute law of some states the married woman may enter into contracts of many kinds. (5) A corporation can make contracts only in accordance with its charter, or with the provisions of the act, or acts, under which it is incorporated, except in cases of "convenience almost amounting to necessity."

Con'vict Labor, the labor performed by prisoners in penitentiaries and reformatories, or under contract with the officials of these institutions. In all penal institutions work is necessary to the welfare of the prisoners and to pay the expenses of the institution. While performing the work connected with the daily routine and making the required repairs give employment to the prisoners for a portion of the time, it is not sufficient to occupy all their time, and work along other lines is necessary. In the United States this labor is performed under the contract system or under the lease

system. Under the lease system the convicts are leased to the contractor for a definite time and at a fixed price, and the labor is performed wholly under his direction. If performed away from the institution, the contractor is responsible for the prisoners under his charge. Under the contract system the labor is performed within the prison and under the direct supervision of the prison officials. The contractor furnishes the raw material and pays a stated amount for the labor, or so much a piece for the articles manufactured. Under neither system does the prisoner receive any portion of the income from his labor.

The following objections have been raised against these systems: (1) Under the lease system the prisoners are so maltreated as to become brutalized, so that at the end of their sentence they return to society in a worse state mentally than when they entered the prison; (2) under both systems the products of convict labor are placed on the market in competition with the products of free labor; (3) that the systems prevent teaching trades and making the prisoners skilled workmen who, upon the expiration of their sentence, will be able to support themselves, and will thus be returned to society with that degree of self-respect that will cause them to obey the laws and lead them to become good citizens.

Many students of prison reform believe that the prisoners, especially the younger men, should be taught trades. They also believe that at least a part of the earnings from convict labor should go to the convict's family to assist in their support. See PRISON.

Convol'vulus, or **Bindweed**, a member of the Convolvulus Family, blossoming all summer. It is a low, twining herb with narrow, almost stemless leaves. The showy flowers open in the sunshine, displaying a spreading, bell-shaped corolla of pale blue with paler throat and yellow tube. It is a relative of the morning-glory, which it closely resembles. The convolvulus is a native of Europe, but was brought here as a gar-

den plant and has now escaped to become a roadside weed.

Con'way Cabal, *Ka bal'*, a conspiracy organized among a group of American colonial army officers and prominent citizens, 1777. Its chief object was the removal of Washington from highest command in the army and the appointment of General Gates in his stead. The conspiracy was named for Thomas Conway, an Irish officer, who had been piqued by Washington's objection to his promotion. Associated with him were Gates, Thomas Mifflin, the quartermaster-general, Congressman James Lovell, Gen. Charles Lee and Dr. Benjamin Rush of Philadelphia. By anonymous correspondence and other underhanded means, the Cabal tried to convince Congress that Washington was less competent than Gates, whose campaigns, outwardly, had surpassed his in brilliance. So successful were the plotters that such staunch patriots as John and Samuel Adams, while not closely identified with the Cabal, were in sympathy with its aims. At the height of affairs, part of Gates's private correspondence fell into the hands of Washington. It was published and the disclosures caused the collapse of the organization.

Con'well, Russell Herman (1842-), an American Baptist clergyman and author, born in Massachusetts and educated at the Yale Law School and Albany University. He served in the Civil War, winning the rank of lieutenant-colonel. After graduation he practiced law in Minneapolis and in Boston. Later the State of Minnesota sent him to Germany as immigration agent, and at the same time he acted as correspondent for the New York *Tribune* and Boston *Traveler*. In 1879 he was ordained to the ministry and began work in Philadelphia, in 1891 becoming pastor of the Baptist Temple. He founded Temple College and became its president. The Samaritan Hospital also owes its existence to him. Mr. Conwell is a popular lecturer and author. He has written biographies of Bayard Taylor, Charles Spurgeon, James A. Garfield and Ruth-

erford B. Hayes, and *Acres of Diamonds*.

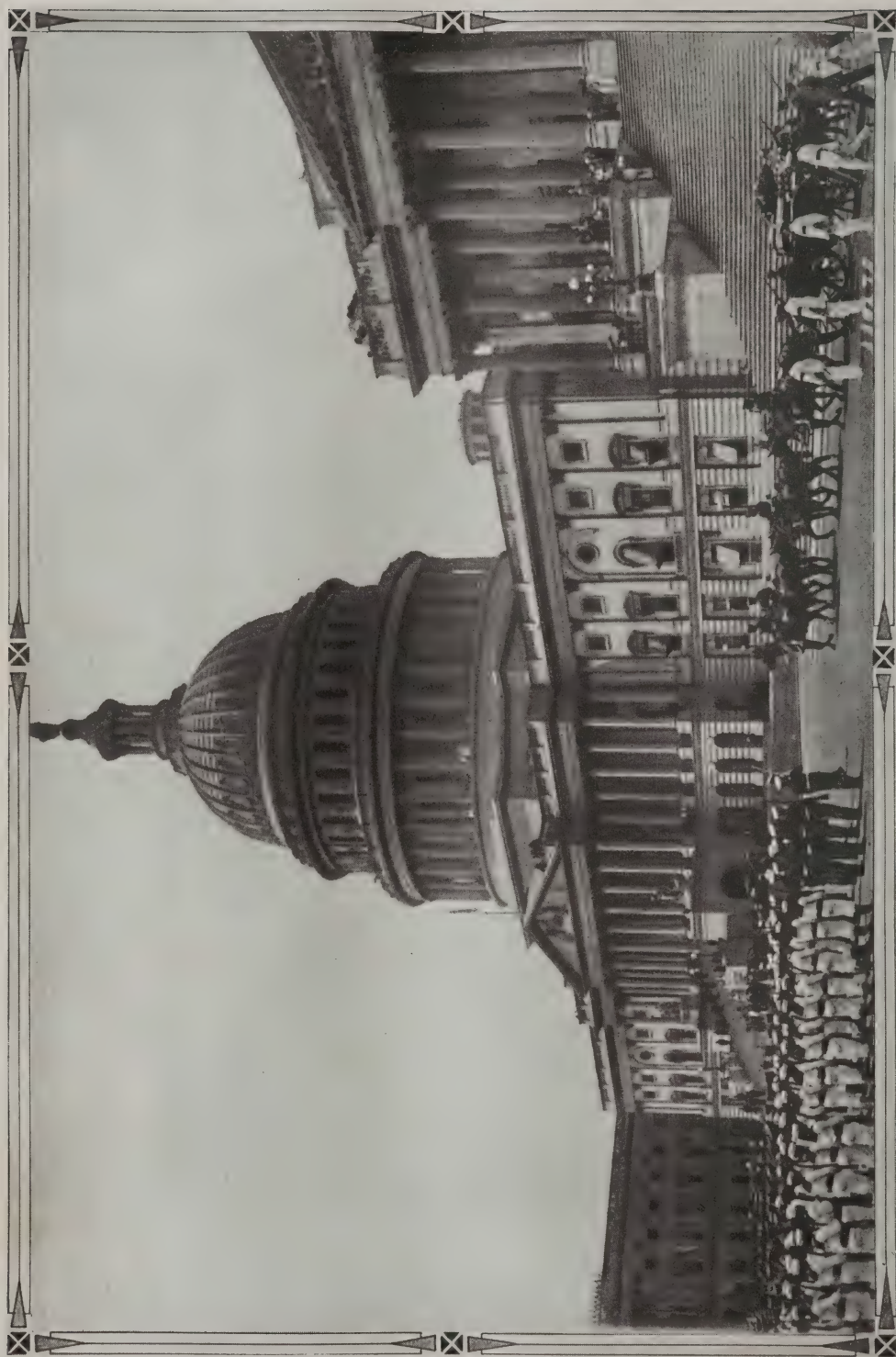
Cook, James (1728-1779), a British navigator. He was the son of a farm laborer and was apprenticed at an early age to a shipowner. In 1755 he joined the navy and in 1759 was made master of the *Mercury*, in which he surveyed the St. Lawrence River and the coast of Newfoundland. In 1768 he became lieutenant in the navy and was sent in command of the vessel that carried the expedition to Tahiti to observe the transit of Venus. During this voyage, beside visiting Tahiti, he went to New Zealand and discovered New South Wales, returning to Britain by way of the Cape of Good Hope. In 1772 Cook, now raised to the rank of commander, made a second voyage of the Southern Seas, exploring Antarctic countries. In 1778 he rediscovered the Sandwich Islands and made valuable additions to the geographical knowledge of the North American coast, in his search for the Northwest Passage. While stopping at the Hawaiian Islands he was killed by the natives. The Royal Society caused a gold medal to be struck in his honor and the government pensioned his family.

Cooke, Edmund Vance (1866-), an American author, born in Ontario and educated in Cleveland, Ohio. He has contributed to the *Saturday Evening Post*, *Century*, *Metropolitan*, *Harper's* and, among numerous other magazines, to the *Independent*, *Munsey's* and *Life*. Besides being the author of writings which include *A Patch of Pansies* and *Little Songs for Two*, he has been on the platform for 14 seasons, reading from his original works.

Cooke, Jay (1821-1905), an American financier, born in Sandusky, Ohio. In 1838 he entered the banking house of E. W. Clark & Co., Philadelphia, as clerk, in 1842 he became a junior member of the firm and in 1861 he established the new firm of J. Cooke & Co. He was agent of the government in negotiating loans to the value of \$2,000,000,000 during the Civil War. The suspension of his firm, agents for the Northern Pacific



CALVIN COOLIDGE



PASSING THE CAPITOL.

Flag-draped coffin containing body of President Harding in solemn procession.

Railroad, caused the panic of 1873. Later Cooke accumulated another fortune in Western lands.

Coolidge, Calvin, (1872-). Thirtieth president of the United States, elevated to that office, from the Vice-Presidency, by the death of President Harding on August 2, 1923. Born on the Fourth of July on a farm near Plymouth, Vt., the son of John Calvin Coolidge and Victoria J. (Moor) Coolidge, he was graduated from Amherst in 1895, with the A. B. degree (LL.D., Amherst, Tufts, Williams, Bates, Wesleyan, U. of Vt.), and studied law at Northampton, Mass., where he began the law practice in 1897. He was married to Miss Grace A. Goodhue, of Burlington, in 1905, and they have two sons, Calvin, Jr., and John.

The public career of Mr. Coolidge: Council Northampton, 1897; city solicitor, 1900-01; clerk of courts, 1904; member General Court of Massachusetts, 1907-08; Mayor of Northampton, 1910-11; member State Senate, 1912-15; Lieut-Gov. Massachusetts, 1916, 17, 18; Governor, two terms, 1919, 20; Vice-President of United States 1921-23.

While Governor, Mr. Coolidge attracted wide attention by his vigorous handling of the strike of policemen in Boston in 1919. He was elected Vice President on the republican ticket with Mr. Harding, and was the first Vice-President to have a seat at cabinet meetings.

Personally Mr. Coolidge is a slender man of such few words as to have earned for himself the name, "Silent Cal." He spoke only forty-four words in his inaugural address as President of the Massachusetts Senate, thus:

"Honorable Senators, My sincerest thanks I offer you. Conserve the firm foundations of our constitution. Do your work with the spirit of a soldier in the public service. Be loyal to the commonwealth and to yourselves. And be brief. Above all things—be brief."

Mr. Coolidge is a protectionist of the rock-ribbed New England order, in religion a Congregationalist, a practical farmer and a student of economics.

Cooper, James Fenimore (1789-1851), an American novelist, born at Burlington, N. J. The family removed to an estate near Otsego Lake, N. Y., when Cooper was in his second year, and the boy spent his boyhood years in a home surrounded by forests and in a locality where Indian raids were always imminent. Here he found the materials for the famous *Leather-Stocking Tales*. Sent to Yale in 1803, he was expelled in his third year for neglecting his work,

and then entered the merchant service. He received a midshipman's commission in 1808, gaining considerable naval experience by the time of his resignation three years later. He finally settled on a farm in Westchester County, but did not begin his literary career for nearly ten years. Cooper's first novel, *Precaution*, written in 1820, had little success, but *The Spy*, which soon followed, was the first of a large number of popular tales. The years between 1826 and 1833 he spent abroad, and thereafter lived for the most part on the family estate at Cooperstown. His later years were marred by various quarrels and lawsuits that resulted from his peculiarities of temper and intolerance of criticism.

Cooper is sometimes called "the American Scott." The two were in a measure contemporaneous, for *The Spy* was published in the same year as *Kenilworth*, though Scott had long been writing at this time. The chief resemblance lies in the fact that the best fiction of both writers was based on the romantic past of their respective countries. Cooper is admired among his own countrymen as the author of wholesome stories of forest and sea, having a remarkably truthful background. His plots are somewhat conventional, but they are skillfully put together and hold the reader's interest, and the treatment of dramatic episodes is often extremely vivid. Cooper's Indians and backwoodsmen are idealized and he is fond of repeating types; notwithstanding this he has added several characters to fiction, notably Harvey Birch, Long Tom Coffin, Uncas and other Indians.

Of his 33 novels, the following are representative of his work: the group dealing with frontier life and known as the *Leather-Stocking Series*, comprising *The Deerslayer*, *The Last of the Mohicans*, *The Pathfinder*, *The Pioneers* and *The Prairie*; and *The Spy*, *The Pilot* and *The Red Rover*.

Cooper, Peter (1791-1883), an American inventor, manufacturer and philanthropist, born in New York City. Both his father and grandfather served in the

Revolutionary War. In 1808 Peter was apprenticed to a carriage maker. While in this position he invented a valuable device for mortising hubs. He engaged in several lines of business on his own account, with varying degrees of success, and finally bought 3000 acres of land near Baltimore, where he built the Canton Iron Works. Here he built Tom Thumb, the first locomotive engine ever made in this country. He was prominent in the laying of the Atlantic cable, and was the founder of the Cooper Union in New York City for the advancement of science and art. See COOPER UNION.

Cooperage, *Ko'per aje*, the art of making rounded vessels composed of heads and staves, and held together by hoops, such as barrels, casks, tubs and pails. The art is very old, and formerly a cooper not only put together the materials but he also made them from the timber (See BARREL). Cooperage is known by the name of wet, or tight, cooperage, which pertains to vessels made for holding liquids, and as dry, or slack, cooperage when pertaining to articles for containing fruit, vegetables, dried fish and other similar products. The heads, staves and hoops are sent to the cooperage factory in the rough. Here saws and other ingenious machines do all the work of fitting them together to make the barrel or other vessel. After the staves are cut, trimmed and chamfered by automatic machines to a certain size and pattern, the staves are grooved and afterwards steamed and bent to the desired curve. By these methods there is no cutting when the parts are finally fitted together. Truss hoops are employed to hold the staves temporarily around the heads until the hoops belonging to the barrel can be driven on to tighten up and complete the vessel. In making casks to hold liquids, especially oils, wines and liquids, the best seasoned oak is used, and great care is taken in fitting the parts and in driving on the hoops. Generally these vessels are strengthened by the addition of steel hoops. The cooperage industry is large and employs a large number of peo-

ple, both in the factories and in the country, where the headings, staves and hoops in the rough are produced from the timber.

Cooperation, *Ko op'er a' shun*, (from Latin *co+operari*, to work together), in the widest sense, the act of cooperating or working together. In the broad economic sense, it is the creed that life may be best ordered by mutual help, rather than by selfish competition: "each for all and all for each" is its motto. In the narrower or specific economic sense, the term is used to designate those forms of voluntary association in which men and women unite for the production of wealth or for the distribution of articles of consumption. Economists have generally used the term to apply to three classes of association: distributive cooperation, productive cooperation, and credit cooperation for borrowing and loaning money.

DISTRIBUTIVE COOPERATION. This, sometimes called consumers' cooperation, does away with the middleman and his profits, and the consumers themselves establish and operate stores where they buy at net cost, or have the profits returned to them in the form of dividends. This form of cooperation has been most successful in England, where such stores were inaugurated by the "Equitable Pioneers of Rochdale" in 1844. It is estimated that now about one-sixth of the population of England buy through these stores.

PRODUCTIVE COOPERATION. This is the attempt to do away with the employer by having the workers furnish their own capital. The guilds of the Middle Ages are good illustrations. Agricultural cooperation in the United States and in Europe is increasing in importance. In the former country there are large numbers of successful cooperative creameries, elevators and fruit-growers' associations.

CREDIT COOPERATION. For borrowing and loaning money, credit cooperation had its origin in Germany and has spread to other countries until it has assumed vast proportions. Under this head are

included mutual banks, building and loan associations, and, by some, mutual life and fire insurance associations.

ECONOMIC POSITION. Cooperation occupies a middle ground between competition, on the one hand, and State socialism and communism on the other. It retains the motive of individual gain and ownership, but aims to better social and industrial conditions by uniting the efforts of those who have common interests. It avoids the compulsory element in socialism by insisting upon the importance of the voluntary feature in association. Cooperation always provides that its members shall share in conducting the business and should not be confused with profit sharing. See **PROFIT SHARING**.

Cooper Union, an institution established in New York City in 1853 by Peter Cooper, to provide for the working classes free instruction in applied science, art, and social and political science. As was hoped by Mr. Cooper, others have recognized the value of such an institute, and since about 1900 have contributed for the considerable extension of its facilities. Beside maintaining day and evening courses in technical science and art, the institute now offers instruction in stenography, typewriting and telegraphy, in decorative composition, architecture and interior decoration, in elocution, oratory and debate, and offers several lectures per week on such subjects as engineering, civics and ethics. Degrees are conferred upon the completion of certain courses in science and engineering. Reading rooms and scientific and art museums are maintained. The institution enrolls more than 3000 students. Its endowment is about \$3,000,000 and its total assets probably \$4,000,000.

Coot, or Mud Hen, a bird of the Rail Family. The American coot measures 13 to 16 inches in length. The body is lead-colored; the head and neck blackish; the under tail feathers, the edge of the wing and the tips of the middle wing feathers are white. The bill is white, with a brown spot near the end; there is a narrow, naked shield on the

forehead, and the toes have small lobes on the sides. The nest is made of rushes and grass stems, and is placed on the water. It contains 8 to 12 creamy-white, brown-spotted eggs. The coots frequent the smaller ponds and lakes, which are bordered by grass or rushes, where they gather in considerable numbers. Here they may be seen diving and feeding on snails, aquatic insects and the seeds of water plants. The European coot is similar to the American species in its habits.

Co'pal, a hard resin of varying chemical properties, exuding from the trunks of different tropical trees but most commonly from a tree of the Pulse Family called the Zanzibar copal tree. There are three kinds of copal, fossil, semi-fossil and fresh copal, of which the first is the most valuable. The fossil copal is dug from the ground in localities where copal trees once existed but now have entirely disappeared; the semifossil is obtained from the ground where the forests are located; and the fresh is collected from the trees soon after it exudes from the bark. Fossil copal is covered by a yellowish-brown shell, which must be chipped away before the resin is ready for use; in some varieties of copal this shell is peculiarly pitted and the resulting product is known as New Zealand copal or kauri copal, because it is obtained from the kauri tree of New Zealand.

Chemically the copals are composed of carbon, hydrogen and oxygen in varying per cents. They are extremely hard and soluble only after being subjected to heat and then powdered. They are used in making varnishes, which, on account of their hardness, are used to dress the outside of railway coaches, carriages, etc.

Co'penha'gen, the capital and the largest city of the Kingdom of Denmark, situated on the east coast of the Island of Zealand, a natural channel between this island and that of Amager forming an excellent harbor. The chief buildings include the Palace of Charlottenburg, the Royal Theater, the Church of Our Lady, Holmens Kirke, the Church of Our Redeemer, the Exchange, several

large commercial houses, the somber Thorwaldsen Museum, containing the artist's tomb, the National Museum, the university (the oldest one in Denmark), the observatory, the chemical laboratory, several other churches, palaces, mansions of the nobility, hospitals and technical, veterinary and agricultural schools. The works of Thorwaldsen are one of the chief features of interest and occupy a prominent place in the artistic decorations of the city. The literary, art and scientific associations are numerous, embracing the Danish Royal Society, the Royal Antiquarian, Agricultural and Geographical societies, the Academy of Arts, an Art Union and a musical conservatory.

Commercially the city's importance is indicated by an ever-increasing trade, the harbor and railroad conveniences facilitating transportation. The manufactures are less significant, being represented chiefly by shipbuilding yards and the construction of iron engines; the royal china factory makes models of Thorwaldsen's works in biscuit china. The earliest mention of Copenhagen (meaning Merchant's Harbor) is made in 1043, when it was a mere fishing village. In 1443 it became the capital of the kingdom, and has several times been beleaguered or bombarded by Swedish, English or Dutch forces, the siege of 1807 by the British under Lord Cathcart resulting in the destruction of some of the finest buildings. Population in 1901, 378,235.

Copernican, Ko per' ni kan, System, the system invented by Copernicus about 1530 to account for the control and movement of the planets, and in its fundamental principles generally accepted. Copernicus was not satisfied with the complicated system of Ptolemy, and saw more evidence in favor of the earlier Pythagorean views which he developed into the system that makes the sun the center of the solar system with the planets, including the earth, revolving about it. He also suggested the rotation of the earth on an axis, and the vast distance of the fixed stars. He was

hampered somewhat by the circular system of motion prevalent in his day, so that he failed to work out the elliptical orbits of the planets; and the science of mathematics did not then afford the means of computations by which his system has since been rectified. His theory met with great opposition at first, but the invention of the telescope enabled astronomers to prove beyond doubt that Copernicus was fundamentally correct. See ASTRONOMY; PTOLEMAIC SYSTEM.

Coper'nicus, Nicholas (1473-1543), astronomer, was born at Thorn, Prussia, and died at Frauenburg, Prussia. He studied at Thorn, entered the university at Cracow in 1491, and later studied mathematics, astronomy and medicine at Padua, where he graduated in medicine in 1499. In 1500 he went to Rome, where, through the influence of his friend Regiomontanus, he secured a chair in mathematics, which he filled successfully until his return to Frauenburg in 1505. Here he entered holy orders and was canon of the cathedral during the remainder of his life. He divided his day into three parts: one-third given to his clerical duties, one-third to the practice of medicine among the poor of his parish and one-third to his mathematical and astronomical studies.

From 1507 to 1530 he was working out his system, gleaned from the work of astronomers in the centuries past, especially from Pythagoras, after whom the Copernican System might fairly have been named. Although his great work *De Revolutionibus Orbium* was completed in 1530, Copernicus delayed publication, knowing from criticisms made by some who had read his manuscript that the work would be considered heretical. He was finally prevailed upon to publish, dedicating the work to Pope Paul III. He died a few hours after a volume from the publishers was placed on his bed. Copernicus gathered up the results of past astronomical knowledge, added enough to make his work epochal, and handed it on to others. See COPERNICAN SYSTEM.

Cop'ley, John Singleton (1737-1815), a celebrated historical painter, born in Boston, Mass., of Irish parents. He began his artistic career painting portraits in his native city, and was almost wholly self-taught. In 1760 he sent to Benjamin West, in England, a portrait of a boy with a squirrel, which was exhibited at the Society of Arts and highly praised. In 1774 he went to England, where the remainder of his life was spent. He rose rapidly to fame and was patronized by royalty and by the nobility. His greatest powers were manifested in his portraits, notable among which is *The Daughter of George III. The Death of Chatham* is his recognized masterpiece. Other famous works are *Offer of the Crown to Lady Jane Grey* and *Death of Major Pierson*.

Cop'per, a metal, brilliant reddish in color, and very ductile, malleable and tenacious. No doubt copper was the first metal employed by man in his arts of peace and war, and that he found it extremely useful is indicated by many articles of copper and its alloys in the collections of many museums. Copper owes its name to the Island of Cyprus, the Latin for which is *Cuprium*, where the Romans and Greeks first obtained the metal. Its largest production now is Arizona, Michigan, Montana and Utah in the United States, where 60 per cent of the world's supply is obtained. The balance comes from Russia, Chile, Japan, Mexico, Australia, Spain, Portugal, Germany and Canada.

Copper is nine times heavier than water. Next to silver it is the best conductor of heat and electricity. It is easily hammered, rolled or drawn into almost any shape required; besides, it takes a brilliant polish. It is purified of its compounds by smelting, and is further refined by electrical processes. It does not rust like iron when exposed to water or salt air. Alloyed with other metals, it produces bronze, brass, German silver and gun metal. In its pure state alone it is used for cooking utensils, boilers, pipes, tubes, nails and wire, and as conductors and parts of electrical

apparatus, lamps, etc. It is also employed in electroplating, for lightning rod conductors and for rollers for calico printing. Copper sulphate is used in electric apparatus, in dyes, and in medicine as an antiseptic. See BRONZE; BRASS; ALLOY; ELECTROPLATING.

Cop'peras, or **Green Vitriol**, *Vit' ri ul*, a sulphate of iron usually of a bluish-green color, with an astringent taste, produced commercially from the decomposition of iron pyrites. It is used largely in tanning leather and in dyestuffs, and for making black inks and Prussian blue. When added to water in the proportion of a pound of copperas to a gallon, it forms an excellent disinfectant for the foul odors arising from sewers, sinks and drain pipes. In very diluted solution it is sometimes employed to kill the germs of typhoid fever in drinking water. See IRON AND STEEL; SULPHURIC ACID.

Cop'perhead", a beautifully-colored serpent of the Viper Family, found east of the Mississippi from Massachusetts to Florida. Its body is brown in color with red blotches; its head, as its name implies, is of brilliant, coppery hue. The copperhead is poisonous but not ordinarily vicious. It lives near thick forests, where it feeds upon frogs, birds and small Rodents.

Copperhead, the name applied to Northerners who sympathized with the South in the Civil War. The appellation was intended as a severe censure of a person's loyalty to his government and was developed by acute political differences.

Copper Sulphate, *Sul' fate*, an important salt of copper prepared commercially by roasting copper ores or by heating waste copper and covering the red-hot metal with sulphur. In the laboratory it may be prepared by dissolving copper in sulphuric acid. Ordinarily copper sulphate is a white powder, but upon receiving water of crystallization it forms large blue triclinic crystals and is known as blue vitriol. In this state it is used in electric batteries, cotton dyeing and in the manufacture of copper pig-

ments; it is also the foundation of Paris green and forms a constituent of many insecticides.

Copts, Kopts, the early Christians of Egypt, said to have been converted to Christianity by St. Mark. They have suffered continual persecution at the hands of the Moslems, but in 1907 there were 667,000 Copts in Egypt. They are the purest representatives of the ancient Egyptians. Their customs and dress are Mohammedan; their language, Arabic. They were originally a trading and industrial, rather than an agricultural, people.

Copying Devices, various contrivances for duplicating letters, manuscripts and other documents. One of the oldest and best-known methods is that in which the copying press is used. The letter is written with copying ink, which is the ordinary writing ink containing sugar or some other material to prevent its drying too rapidly. A letter book is provided, with sheets of tissue paper, which are moistened with water, and the letters are placed on them and subjected to pressure in the copying press. Type-written letters can also be copied in a similar way, provided they are written with a ribbon containing copying ink. However, it is now customary either to use the tissue paper in the form of a web, which is passed with the letter between rollers after being dampened, or to use carbon paper. This paper has one side coated with a coloring matter, which, when struck by the face of the type of a typewriter, gives the impression to the paper lying next to it. A stiff pen or pencil also will produce, with carbon paper, a duplicate impression.

HECTOGRAPH. The hectograph consists of a pad made of gelatin and glycerin in proportion of one ounce of gelatin to six and one-half ounces of glycerin. The ingredients should be thoroughly mixed by heating for several hours over a salt-water bath. When poured into a shallow pan and hardened by cooling, this composition makes a smooth, even surface. The matter to be copied is written in special copying ink, and the

written sheet is then spread face down upon the pad and allowed to remain for a few minutes, when the writing is transferred to the pad. Each sheet of paper laid upon the pad retains a copy of the writing. With good ink as many as 100 copies can be obtained.

MIMEOGRAPH. The mimeograph, which was invented by Thomas A. Edison, consists of a finely-corrugated steel plate, a steel-pointed stylus and a printing frame and roller. Paraffin paper is used in the preparation of the copy, which is written upon the prepared paper, with the stylus, over the corrugated plate. This enables the stylus to cut through the wax and make a stencil. The prepared copy is then placed in the printing frame, and a roller, on whose surface printer's ink has been carefully spread, passed over it, reproducing the writing on the paper underneath the copy. The typewriter has taken the place of the stylus and corrugated plate, and the printing device now usually employed works on the principle of a cylinder printing press. See **BLUE PRINT**.

Copy'right'', the sole right granted by law to authors and artists to reproduce, publish and sell their works for a limited time. Works which can be copyrighted in the United States are classified as follows: (a) books, including composite and cyclopedic works, directories, gazetteers and other compilations; (b) periodicals, including newspapers; (c) lectures, sermons, addresses, prepared for oral delivery; (d) dramatic or dramatico-musical compositions; (e) musical compositions; (f) maps; (g) works of art; models or designs for works of art; (h) reproductions of a work of art; (i) drawings or plastic works of a scientific or technical character; (j) photographs; (k) prints and pictorial illustrations.

To procure a copyright for works which are published and for sale: (1) publish the work, with the notice of a copyright; (2) immediately upon publication, send two copies of the work, together with the registration fee of \$1, to the register of copyrights, Library of Congress, Washington, D. C. For plays

and musical compositions, typewritten copies may be sent previous to publication, but two copies of the printed publication must also be sent before the work is placed on sale. To insure protection the notice of copyright must appear in each copy of the book, pamphlet or picture. The prescribed form is: Copyright 19— by (author's or publisher's name).

In case of a book, the law requires that this notice be on the title page or the page following. In case of books by American authors or residents of the United States, the copies deposited must be accompanied by an affidavit under the official seal of an officer authorized to administer oaths, stating that the typesetting, printing and binding were done in the United States.

The original term of a copyright is 28 years. One year before the expiration of the original copyright the author or, in case of his death, his heirs may secure an extension for 14 years by filing an application accompanied by the registration fee, and sending two copies of the work. At the expiration of the term of renewal, the copyright ceases.

A copyright can be assigned the same as any other property, but the assignment must be in writing and must be recorded in the office of the register of copyrights.

CANADA. The copyright law of Canada is administered by the department of agriculture. Copyrights are issued "to any person domiciled in Canada or any part of the British possessions, or in any city of any country which has an international copyright treaty with the United Kingdom." The term is for 28 years, renewable for 14 years, with the understanding that the copyright expires in Canada when it expires in any other country. All works copyrighted must be produced or reproduced in Canada. The fee is \$1, and each copy must bear the copyright notice, the legal form for which is, "entered according to the Act of Parliament of Canada in the year 19— by (author's or publisher's name) at the Department of Agriculture."

INTERNATIONAL COPYRIGHT. It is only within recent times that copyright privileges could be secured in any country except that in which the author resided. The first effort to secure international copyright was made by a convention at Bern, Switzerland, in 1885. In 1891 the United States signed articles of agreement, by virtue of which the citizen of any country may secure in this country a copyright on the same terms as a citizen of the United States, provided the country in which the citizen lives grants equal privileges to citizens of the United States.

Coquelin, Kok lan', Benoit Constant (1841-1909), a French actor, born in Boulogne. He created the leading parts in over 40 new plays, toured through the capitals of Europe, and acted with Sarah Bernhardt, dying while preparing to play in Rostand's *Chantecler*. His most popular rôle was that of Cyrano de Bergerac. He wrote *The Actor and His Art*, *Molière and the Misanthrope* and essays on Eugene Manuel and Sully-Prudhomme.

Cor'al, a secretion of limy formation produced in the bodies of various marine animals, often wrongly spoken of as coral insects. The power of producing coral belongs to four different organisms: the polyps, which are the most important and are the chief source of the coral reefs; hydroids, which are related to the polyps; bryozoans, chiefly known through fossil forms whose skeletons compose the greater part of the limestone beds; and the algæ, or seaweed, some forms of which have the power to take up lime from the sea water and transform it into coral.

The true coral-making animals, or polyps, belong to the order Cœlenterata, one of the great subdivisions of the animal kingdom. They greatly resemble the sea anemone, their near relatives, in structure, although the corals are of various forms and sizes. In general they have jellylike bodies, with a central mouth surrounded by tentacles, or little waving arms, which set up currents in the water and draw food particles, thus brought near, toward the mouth. The

coral is not, as many suppose, the dwelling of the coral polyp built up little by little with great labor, but is a sort of skeleton formed by the secretion of lime from the sea water in various tissues of the polyp. It is always secreted in the side and lower parts of the polyp and never in the mouth parts, stomach or disk. It is most frequently found in the partitions of the animal's body. In free-swimming polyps the coral formation is begun before the animal fastens itself upon a rock or other resting place, and forms a sort of skeleton which serves, as does that of higher animals, to support the body. Most polyps reproduce by budding, and the young never become

branches known as tree coral are formed. In such a branch only the younger polyps are alive. In a perfect state the skeleton of the polyp is wholly concealed; as its age increases, however, the covering gradually dies away, leaving more and more of the coral exposed. Coral formations are found only in tropical and subtropical regions, as the water must be at a temperature of 68° F. or above to support the polyp life. In the illustration 1 represents brain coral; 2, coral with polyps; 3, tree coral; and 4, organ pipe coral.

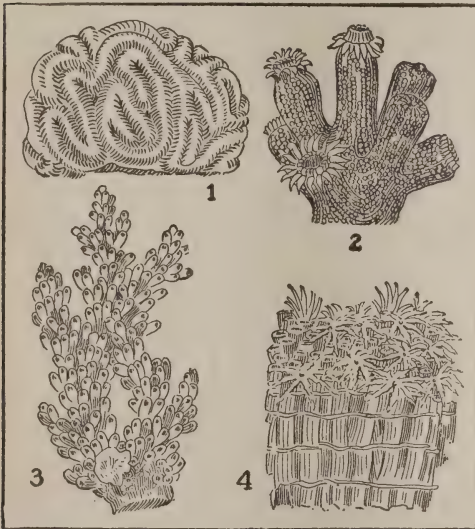
COLORS. Coral is pink, red or black in color, is susceptible to polish and is of value for its use in jewelry. For this purpose the red "precious coral" is chiefly employed; the principal source of this species is the Mediterranean Sea, from the bed of which it is secured by a specially designed apparatus which breaks it from the rocks and brings it to the surface.

SPECIES. The species of coral are given common names from the forms which the colonies assume. The best known are tree coral, brain coral, mushroom coral, organ-pipe coral, sea fans and sea pens.

CORAL REEFS. The coral itself comes only to within five or six feet of the surface, as it cannot live in the water found above this. The upper part of the reef is formed of silt and rock washed up by the waves against the coral foundation and lodged there. Such reefs, if formed near the shore line, are known as barrier reefs; those circular in form are known as atolls (See ATOLL), and if they are only separated peaks they are called coral islands.

Coral Sea, a name given to that part of the Pacific Ocean included between Australia and the New Hebrides. It receives its name from its many coral reefs and islands.

Coral Tree, a slender tree of the Pulse, or Pea, Family, common in the East and West Indies and sometimes cultivated in the United States as a hedge plant. It has thick foliage and scarlet



CORAL

separated from the parent. In such species a protuberance, or bud, appears upon the side of the parent, which enlarges until nearly the size of the parent; from this, tentacles protrude, a mouth opens and an individual is there formed which, though having canal connection with the original parent, is still a distinct organism. It, in turn, may give rise to other individuals, until a great treelike branch is formed. The parent polyp, dying, leaves its coral secretion as a base upon which the succeeding generations grow, and as these in turn die the great

flowers. Its fruit is a long, cylindrical pod, containing coral-red seeds.

Cor'dage, a term generally applied to cords of all sizes, varying from twine to the largest cable, but cordage over an inch in circumference is usually known as rope. Most cordage is made of hemp, but cotton, flax and coir are used for some varieties, and steel wire has replaced vegetable fiber in the manufacture of cables. All cordage is made by machinery. When the fiber is received at the mill, it is first cleaned, then combed to free it from tow and to straighten the fibers, when it is ready for spinning. As the yarn is formed, it is wound on bobbins. If rope is to be made, the yarn is twisted into strands by machines called formers, and the strands are twisted into rope by machines called layers. In the manufacture of hemp cables, ropes take the place of strands; otherwise the process is the same. If a tarred rope is desired, the yarn is passed through a tank of hot tar before being twisted into strands. A hawser-laid rope is made of three strands twisted to the left. A cable-laid rope is made of three strands of hawser-laid rope twisted to the right. See BINDING TWINE.

Corday d'Armont, *Kor day' dar'mon'*, **Charlotte** (1768-1793), a patriot girl of the French Revolution, and an enthusiastic adherent of its principles. She was a descendant of the great tragedian, Corneille. During the Reign of Terror she determined to free her country of one of the leaders, and gaining an audience with Marat July 13, 1793, she stabbed him to the heart. Four days later she was executed.

Cordillera, *Kor"dil ya'ra*, the system of longitudinal mountain chains which extend along or near the Pacific coast of North and South America. The name was first applied to the Andean chain in South America and later to the continuation of these mountains in Mexico. In North America the ridges of mountains extending parallel with and including the Rocky Mountains and the Sierra Nevadas are known as the Cordilleras, and the region crossed by them as the Cordil-

leran region. The term is commonly employed where there are two or three parallel chains in distinction from the principal ridge. Its use, however, varies with locality.

Cor'dova, the capital of the Province of Cordova, Spain, situated on the Guadalquivir River, 130 m. from its source and 180 m. s.w. of Madrid. It is an old city known to have been a possession of the Romans as early as 152 B. C.; later it was taken by the Saracens, and much of the architecture shows the influence of the two races. The old Moorish wall about the city, of which ruins remain, was built upon a Roman foundation, and the great 16-arch bridge across the river shows the same combination of Roman and Moorish work. The city is now much smaller than at the time of its greatest power, and many historic buildings have been removed to make way for gardens and olive and lemon groves. The streets in the central portion of the town are narrow and crooked, but the buildings, whether ancient or modern, are kept immaculate by frequent applications of whitewash.

The great Mohammedan mosque, only slightly smaller than St. Peter's at Rome, is the building of chief importance. It once boasted of 1200 pillars and rich mosaics, but, though its vast hall is still in a state of preservation, and though it is second only to Mecca as a Mohammedan shrine, much of its former magnificence is gone. Other buildings of interest are the Alcazar, or royal palace, built in the tenth century and now in ruins except for one wing which is used as a jail, the old monasteries, the bishop's palace, the city hall, the hospitals, the churches and the colleges, including an academy for girls founded in 1590. Cordova was originally celebrated for its silversmiths and for its hand-wrought leather known as cordovan. Its chief industries now are the distillation of spirits and the manufacture of woollen, linen and silk goods and of filigree work. Cordova ceased to be a commercial center when taken by Ferdinand III of Castile in 1236. Population, 58,275.

Corel'li, Marie (1864-), an English novelist, born in Italy. Of Italian and Scotch descent, she was adopted in childhood by Charles Mackay. She studied in London and in a French convent, where she also received a good musical education. Her first work was published in 1886. Her novels have satisfied the public demand for sentiment and melodrama but fall short when gauged by literary standards. Among the best known are *The Romance of Two Worlds*, *Thelma*, *Barabbas*, *The Sorrows of Satan*, *The Master Christian* and *Temporal Power*.

Co'rian'der, a branching herb of the Parsley Family, whose seed is used as a spice. It is a hollow-stemmed plant growing from one to three feet high and having feathery, strongly-scented foliage. The lower leaves are divided into rather broad leaflets but the upper ones are much more finely divided. The flowers are small and white and grow in flat-topped clusters at the ends of the branches. The fruit is beadlike, with a sweet taste and less disagreeable odor than the leaves. Coriander seed is used for spicing bread, candy and drinks and is used medicinally, but is far more popular in Europe than in the United States. Here it is considered a weed which has lost caste as a garden herb, but is not particularly troublesome in its new rôle. The flowers are in blossom all through the summer.

Cor'inth, a city of Greece, situated upon the Isthmus of Corinth that connects northern Greece with the Peloponnesus. Ancient Corinth, celebrated in history, stood one and one-half miles west, and was a city of wealth and power. In the center stood the citadel, the Acrocorinthus, on an elevation 1886 ft. high, and on each hand lay its harbors, Lechæum and Cenchreæ, between which a tramroad transported the ships from the west to the Gulf of Athens; thus Corinth was a city of considerable commercial importance. It was destroyed by the Roman consul in 146 B. C., rebuilt by Julius Cæsar about 100 years later and captured by the Turks in 1458 A. D.

From 1687 to 1715 the Phœnicians held it, but the Turks regained possession and maintained it until 1823. In sacred history Corinth is important as a temporary residence of St. Paul, and to the Church at that city two of his Epistles are addressed. Present population, 4188.

Corinth, Miss., a city, the county seat of Alcorn Co., and 90 m. s.e. of Memphis, Tenn., on the Mobile & Ohio and the Memphis & Charleston railroads. During the Civil War Corinth was of strategic importance, being the junction of two railroads; though the Confederates fortified it, they abandoned the place after the Battle of Shiloh. Some four months later, Oct. 3, 1862, Van Dorn and Price, with 22,000 troops, made a desperate attempt to regain the city, where great Federal supplies were being guarded by Rosecrans and 23,000 men. Then and at the real contest, which occurred the following day, Rosecrans displayed great ability, winning a victory which, next to Antietam, the North considered the most vital of the season.

Corinth Canal, a ship canal, 72 ft. wide, 26 ft. deep and 4 m. long, across the Isthmus of Corinth (Greece), connecting the Gulf of Corinth with the Gulf of Ægina. Its use saves ships entering or leaving ports on the Adriatic Sea about 175 m. The idea of constructing a canal across this isthmus was approved by Alexander the Great and later by Julius Cæsar; while it is said that Nero actually did a little excavating for it. Begun in 1884, the canal was completed in 1893.

Corin'thians, Epistles to the. See PAULINE EPISTLES.

Co'riola'nus, Caius Marcius, legendary patrician general of Rome. He gained his surname because of his bravery at the siege of the Volscian city, Corioli. In 492 B. C., during a famine in Rome, he advocated that grain should not be distributed among the people unless they gave up their tribunes. He was exiled and took refuge with the Volscians, and soon returned at the head of the Volscian army. The city was in dire straits, for Coriolanus would listen to no

terms unless the Volscian land was restored and the Volscians themselves admitted as Roman citizens. At last his aged mother went to his camp and persuaded him to spare the city.

Cork, the outer bark of an evergreen of the oak species, known as the cork tree. It grows in southern Europe and in northern Africa near the sea, Algeria, Spain and Portugal producing the most of it. The tree is of a low, spreading variety, attaining a height of from 20 to 60 ft. The trunk sometimes reaches a circumference of 15 ft., and bears chestnutlike acorns. It frequently lives to an age of 300 and 400 years.

The cork trees are first stripped when they are about 12 years old, and this material forms the coarsest and cheapest cork, which is employed principally for fish-net floats. The quality improves with the age of the tree. The outer bark is cut around the tree and up and down by a special form of ax or knife; only this outer bark is removed, care being taken not to injure the inner bark by too deep cutting. After the bark is removed the outer surfaces are scraped, and the cork material is heated and slightly charred. Afterwards it is pressed flat and baled for shipment.

Owing to its being elastic, light and tough, and to the fact that liquids cannot pass through it, the uses for cork are numerous. Life preservers are made principally of it, also artificial limbs, bicycle handles, insoles for shoes and bottle stoppers. To cut the rough cork sheets requires sharp cutting knives, which become dull quickly and require frequent whetting. While this work was formerly done by hand, machinery is now exclusively used. The cork chips, or refuse from cork cutting, are ground up with boiled linseed oil, which, applied to canvas, forms linoleum, used in place of carpets (See **LINOLEUM**). Cork scraps are sometimes cemented to paper and used to wrap up bottles and to provide a damp-proof material for houses.

Cork, the county seat of County Cork, Ireland, situated upon the River Lee, 165 m. s.w. of Dublin. The center

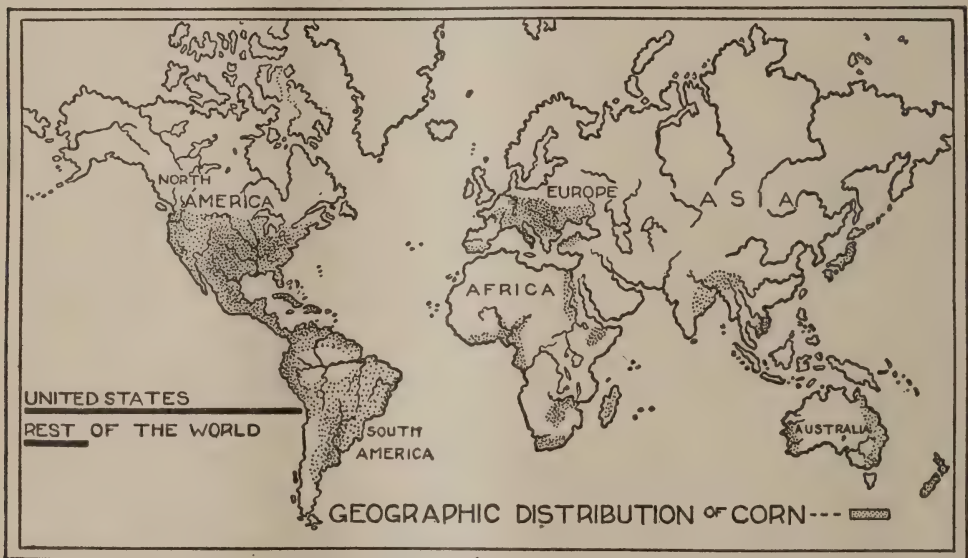
of the city occupies an island encircled by two branches of the river, and numerous bridges connect the wide streets of the central portion with those of the outlying districts. Cork is a commercial city of importance because of its fine harbors and modern docks and slips. Cattle, butter and fish are exported. The industries include distilleries, tanneries, breweries, foundries and manufactories of metallic wares, woolen goods, tweeds, gloves and fertilizer. Cork has many fine buildings, chief among which are its religious and educational institutions. Among these may be mentioned the Catholic and Protestant cathedrals; the Church of St. Anne Shandon, whose tower and bells are celebrated in Prout's *Bells of Shandon*; the University College, formerly known as Queen's College; Crawford School of Science, Munster Dairy and Agricultural School, Royal Cork Institution and a public library. The surroundings of the city are attractive, and the military posts guarding the harbor add to its interest. Population, 76,122.

Cor'morant, the common name of a family of birds related to the pelicans. The neck is long, the bill is long, compressed and hooked at the end, and the feet have webs between all of the toes. The tail is very short. The nests (often in colonies) are placed on rocks or in trees and are large, ragged masses of sticks. Three to five bluish or greenish eggs are laid. The young are naked and blind and require considerable time to attain their growth. The nesting sites are usually decorated with fish bones, fish forming the principal food of this bird. The members of this family are found throughout the greater part of the world and a large number of species are known. Upwards of eight species and races live in North America.

DOUBLE-CRESTED CORMORANT. This is the most common. Its plumage is glossy, greenish-black and slaty, with a black crest of curved feathers behind each eye. The pouchlike throat is orange. This cormorant breeds throughout northeastern North America and winters along the Gulf coast.

Corn, Indian Corn or Maize, *Maze*, a cereal belonging to the Grass Family and closely related to sorghum and sugar cane, both of which the plant resembles in its general appearance. In the Old World corn means any sort of grain, as oats, wheat, rice, but in the United States it always means Indian corn, or maize. Corn is an American plant and was unknown previous to the discovery of the New World. It was a staple of the Indians from Mexico to Canada, but, owing to their crude methods of agriculture, the grain was so inferior to that now grown it would scarcely be recognized. It was early introduced into Europe and later into India, but the United States is the

it is grown. It is erect, jointed and slightly concave on one side. The joints, or nodes, are larger than the stalk, which they separate into sections. The joints strengthen the stalk and are nearer together towards the bottom than at the top. The stem is covered by a thin outer layer, which is very compact and difficult to penetrate. This covering protects the inner structure from rain and from the ravages of sucking insects. Just within this layer is the woody wall, which supports the stem and gives it strength. The center is filled with the pith, a light spongy substance in which plant food is stored for ripening the seed late in the season. Extending through the pith the



great corn-producing country, raising about three-fourths of the world's supply. The other countries worthy of mention, in order of their importance, are Austria-Hungary, Argentina, Mexico and Italy.

THE CORN PLANT. Corn is an annual plant with a herbaceous stem. The botanical name (*zea mays*) is derived from the Greek word *zoo*, meaning to live, and the Livonian word *mayse*, meaning bread, or the staff of life.

The Stalk. The stem ranges in height from about 2 to 18 ft., according to the variety of corn and the locality in which

entire length of the stem are threadlike tubes, which convey nourishment from the roots to various parts of the plant.

The Leaves. The leaves begin at the joints and for some distance form a sheath around the stem. They are arranged alternately on the stem and are long, narrow and pointed. According to the best authorities the average length of a leaf in the large varieties of corn is 36 inches, and the surface area, including both sides, is 228 square inches. Allowing 12 leaves to the stem, this would give 19 sq. ft. of leaf surface for each stalk.



CORN

One of the chief functions of the leaf is the evaporation of water drawn up through the roots. The corn plant requires 500 lb. of water for the formation of one pound of solid matter. On this basis for calculation, weigh a single dry stalk of corn with the ears and determine the quantity of water that passed through the leaves of that stalk during the season. The leaves have within themselves, however, the power to check the enormous evaporation when the roots do not receive a sufficient supply of water.

The Root. Like all grasses, corn has a fibrous root system. There is no large central root or taproot as in clover, but the roots vary in size, and in large plants they extend into the ground several feet. At first they extend laterally a few inches below the surface for two or three feet, sloping gradually downward, then descend deeper into the earth. All the main roots send off numerous branches so that the root system is very extensive. The roots hold the plant in position and supply it with water and the plant food it receives from the soil.

As the plant increases in size roots branch off from the lowest joint in the stem and extend to the soil in a diagonal direction. These are called secondary roots and are chiefly for the purpose of holding the stalk in an upright position and supporting it against the wind.

The Flower. Each plant bears two sorts of flowers: the tassel, or staminate flowers, and the silk, or pistillate flowers. These are usually called male and female flowers by the farmer. The tassel contains the pollen, which when ripe is scattered by the wind. Since much of the pollen is wasted a large supply is necessary, and the estimates of agricultural experiment stations give an average of 30,250,000 pollen grains to a plant. The tassels usually appear about seven days before the silk. The female flowers, or silk, spring from a spike, commonly known as the cob. This springs from the stalk in the axil of the leaf. It is covered with leaves of special form, known as husks, the whole structure constituting the ear. Each female flower

starts from a small structure on the cob, which is the basis of a kernel of corn. The silk extends along the cob under the husks and grows out at the end of the ear, forming a beautiful tassel of greenish-brown, several inches in length. The outer end of each silk is split and contains a sticky fluid which holds the pollen that falls upon it. There is one silk for each kernel and an average of 800 kernels to the ear.

FERTILIZATION. The silks appear a few days before the pollen sacs are ready to discharge their contents. When a grain of pollen lodges on a silk, the moisture present and the heat of the sun cause it to germinate and send down through the hollow silk a tiny pollen tube to the ovule in the kernel, and the fertilizing matter from the pollen grain passes down this tube to the ovule and unites with an egg cell that has been formed there. This process constitutes the act of fertilization, and as soon as it is completed the kernel begins to grow.

Development of the Ear. The kernels are arranged on the cob in rows, which in perfect ears extend in straight lines from the butt to the tip. The silks start first from the kernels at the butt and consequently these are the first kernels to be fertilized. The development of the ear is from the butt towards the tip, and the kernels at the butt ripen earlier than those at the tip. This is very noticeable in short seasons when the kernels on the last third or possibly the last half of the ear fail to ripen. The number of rows on the ear varies in different varieties of corn, but it is always an even number. A perfect ear should be filled with kernels from butt to tip.

VARIETIES. Through breeding and cultivation over 800 varieties of corn have been produced. All these varieties have been classified into seven groups, six of which are important. They are:

1. *Pod Corn.* The varieties in this group have each kernel enclosed in a pod or husk, with the ear also enclosed with husks. This is the corn grown by the Indians and from which other varieties

have been developed. For this reason it is sometimes called primitive corn.

2. *Flint Corns.* The varieties in this group are characterized by kernels with a hard, smooth and glossy outer coat, which is usually of a deep golden-yellow. The plants seldom exceed eight feet in height. The ears usually have eight rows, but in some varieties have 12. The flint corns mature in a short season and are raised farther north than the dent corn. The kernel is rich, sweet and highly nutritious.

3. *Dent Corns.* These varieties are so called because of a peculiar indentation at the summit, or outer end, of the kernel, which is formed by the shrinkage of the starchy matter in drying. The ears are much larger than those of the flint corn and the kernels are more angular in shape, but glossy and deeper. The dent corn is raised throughout the Corn Belt of the United States, and it is the corn of commerce.

4. *Soft Corns.* The varieties in this group have soft kernels, but they are seldom indented. This is the corn found buried with the ancient Aztecs and Incas and is sometimes called mummy corn. Soft corns are generally grown in the Southern regions.

5. *Sweet Corns.* Sweet corns are soft, but shrink in drying, making a shriveled kernel. They contain a larger percentage of sugar than any other varieties and are extensively grown for table use and canning. Sweet corn was procured from the Susquehanna Indians in 1779.

6. *Pop Corns.* The pop corns have small ears, kernels and germs, the chief characteristic being the strong, tough outer coat of the kernel, which in the best varieties completely covers it and makes popping possible. In popping, the kernel literally turns itself inside out, which can be done only when the covering of the kernel is strong enough to resist the steam pressure formed by the moisture within the kernel when heated and until a force sufficiently strong to accomplish this is developed. Hence other varieties of corn may parch, that is, crack open, but they cannot pop.

CULTIVATION. The production of a profitable corn crop depends upon the soil, the climate, the seed, the preparation of the ground and the cultivation of the growing crop. Corn can be successfully raised on a variety of soils, but it thrives best on a dark, rich loam. Since the yield of grain depends upon the size of the stalk more than in any other cereal, corn should not be planted in poor soil. Corn land should be well drained, so that the water table will be three or four feet below the surface; otherwise the roots will extend laterally and not penetrate the deeper layers of soil, from which much of the plant food is obtained.

In its native state corn is a semitropical plant, but its range has been extended by cultivation from Mexico to the extreme northern part of the United States and into Canada. The northern limit of production has been advanced fully 100 m. since the Civil War. It requires warm summers, with plenty of sunshine, but it can endure neither extreme heat nor prolonged drouth. It is easily damaged by frost, hence the limitations of the corn-producing regions are determined largely by the length of the season. This varies in different localities from 90 to 160 days, and in the best parts of the Corn Belt it may extend to about 170 days. Corn requires a large amount of water and the plant is not successful in arid or semiarid regions. The most desirable regions are those where the greater part of the rainfall occurs during the growing months, or July and August, as in the Corn Belt. At this time the plant is putting forth its leaves, ears and tassels and requires a large supply of food.

Before planting, the ground should be plowed, disked and harrowed until the seed bed is thoroughly pulverized to a depth of several inches. Planting is done by a machine, hauled by horses (See CORN PLANTER). For dent corn the hills are usually three and one-half feet apart each way. But while this is the standard measure, it is varied to conform to the variety of corn and nature of the soil. Large rank-growing varieties need to have rows farther apart, and in the



THE CORN PLANT

<p>HUSKS</p> <p>MATTRESS MATS</p> <p>COBS</p> <p>FUEL</p> <p>PIPE</p>	<p>THE CORN</p> <p>CORN SYRUP WHISKEY ALCOHOL GLUCOSE CORN OIL CORN MEAL CORN FLAKES STARCH NATIONAL CORN PRODUCTS CO. OIL CAKES</p>	<p>STALKS</p> <p>PACKING FOR BATTLESHIPS</p> <p>PAPER PODDER FERTILIZER</p>
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PRODUCTS OF A CORN BELT

Southeast, where the climate causes a rank growth, the rows are sometimes six feet apart. The depth for planting is usually from one to two inches and the standard number of stalks to the hill is three, but on very strong fertile soils it may be four or even five.

The seed should be selected with the greatest care. In the Corn Belt much attention is given to growing, selecting and testing seed corn, and Illinois has a seed-growers' association. Before planting, the seed should be tested so that the farmer may know how many kernels in every hundred he can probably depend upon to germinate. So far as possible seed should be raised upon the farm on which it is to be planted or in the immediate vicinity, because when brought from any distance it will not usually produce so large a crop, since corn is very sensitive to change of climatic conditions.

Corn should be cultivated at frequent intervals, while growing. The cultivation usually continues until the plants become so large that they are liable to be broken down by the team. Then the crop is laid by to ripen.

HARVESTING. Harvesting should be delayed until late in the season, since the kernel derives nourishment from the cob after the leaves and husks turn brown. Notwithstanding all the corn-harvesting machinery that has been invented, the greater part of the corn crop is still harvested and husked by hand—a task which in the great corn states often extends far into the winter, and taxes the entire population. In a field yielding 50 bushels to the acre, one man with a team and wagon will gather and husk 70 bushels a day. The corn harvester and shredder is in successful use on many large farms. This machine cuts the stalks, picks and husks the ears and shreds the stalks for fodder. It requires from four to six horses to operate it and two teams with wagons to haul the corn to the cribs. It will harvest from eight to ten acres a day.

Corn should be stored where it is exposed to a free circulation of air and is protected from moisture. The ideal

storehouse is a long, narrow crib, with the floor raised about two feet from the ground and the sides made of slats, placed about two inches apart. The roof should project over the sides far enough to keep the rain from beating in on the corn.

MARKETING. Corn can be shelled and marketed as soon as it is thoroughly dry. Shelling is by machines, operated by gasoline or steam engines. The largest of these machines will shell or thresh from 2500 to 4000 bushels a day. The shelled corn is hauled to the elevators, where it is stored until needed for use. Most of the farmers in the Corn Belt are in such condition financially that they can hold their crop until it can be marketed to the best advantage.

THE CORN CROP. In 1921 there were 103,850,000 acres planted to corn in the United States and the total crop amounted to 3,081,251,000 bushels. This was an average of 29.2 bushels to every man, woman and child in the country. This crop would fill a crib eight feet wide and eight feet deep extending around the world. The United States produces about three-fourths of the world's crop, and the leading states in the order of their importance are Illinois, Iowa, Missouri, Indiana, Nebraska, Ohio and Kansas.

DISEASES AND PESTS. The corn plant is subject to damage or destruction from insect pests.

Diseases. Corn blight is a disease which attacks the young plant in the roots and the full-grown plant in the stalks. The attack upon the roots dwarfs the growth and destroys the crop. The attack upon the stalks lessens the yield and renders the stalks worthless as fodder. Destroying the affected plants is the only sure way of preventing the disease. Corn wilt is a disease which causes the plants to wilt and dry up. When young plants are attacked, they die within a few days, but older plants will live for some time. The disease is caused by bacteria and no remedy has been found. Another damaging disease is leaf blight. This is caused by a minute fungus, which

cannot be detected without the use of a magnifying glass. Under the glass it appears as round, brownish dots. This disease is seldom found and is not considered of economic importance. The two diseases most commonly recognized are smut and rust. See RUST; SMUT.

INSECTS. The corn crop is also subject to devastation from numerous insects, the most important of which are described under their respective titles. See CLICK BEETLE; CUTWORM; WEBWORM; MAY BEETLE; APHID; CHINCH BUG; ARMY WORM; FUNGICIDE; INSECTICIDE.

CORN PRODUCTS

EXTENT AND VALUE. Corn yields a greater number of products and is more generally useful than any other cereal, and, with the exception of rice, constitutes the food of a larger number of people than any other plant. In various forms it serves the farmers' families as a wholesome and nutritious food; the green fodder corn supplements the pasturage in the summer; and in the form of ensilage the entire plant is used for fodder during the winter. Indirectly it supplies the milk of the dairy and the beef and pork of the packing houses. It is the greatest source of income and wealth throughout the great agricultural region known as the Corn Belt. Practically all the plant is useful, and the great variety of products obtained from it may be classified as products obtained from the kernel, products obtained from the cob and products derived from the stalk.

PRODUCTS FROM THE KERNEL. The products obtained from the kernel are:

Corn Meal. Corn meal is the most common form in which corn prepared for food is placed on the market. It is usually ground in three degrees of fineness, known as coarse, medium and fine meal. The old stone mills ground the entire kernel, and the meal contained the hull, the starch and the germ, but in modern mills the germ and the hull are removed before grinding. The excess of oil in the germ causes the meal to become rancid when stored for any length

of time in warm weather. Hence its removal is necessary. White corn is generally preferred for grinding, because white meal sells better than the yellow. The finest grade of meal is sometimes used to adulterate wheat flour.

Hominy. The name hominy is applied to various preparations. In the Central and Western states it means the whole kernel, from which the hull has been removed. This is done by soaking the corn in a weak solution of some alkali, which loosens the hull so that it can be easily rubbed off. The corn is then thoroughly washed to remove the alkali and cooked. Most of it is canned before being placed on the market. In the New England States this preparation is generally known as hulled corn. Samp, or cerealine, consists of the cracked corn which, when cooked, forms a porridge or pudding.

Corn Flour. Corn flour is prepared by washing away the proteid and fat and grinding what remains. It is really a form of starch, but is not considered as an economical article of food, because it has been deprived of its most nutritive properties.

Corn Flakes. Corn flakes are made from corn grits, which are first salted and sweetened, then steam cooked, dried and rolled into thin, flat flakes. The flakes are toasted in ovens and placed in boxes for the trade. They are of some nutritive value and constitute a popular breakfast food.

Bran. The hulls obtained in the manufacture of meal are ground and form bran, which is of value to mix with more highly concentrated stock foods.

Gluten Meal. Gluten meal is one of the more recent corn products placed upon the market. It is procured from the gluten, which is separated in the manufacture of starch and other products. When freed from the starch and dried, it is placed on the market as a food. Mixed with bran it is sold as gluten food.

Corn Oil. Corn oil is obtained from the germs. They are dried, then ground to a fine flour. The flour is steamed and

CORN

the oil extracted by pressure. The oil is used for lubricating, for the manufacture of paints and in making rubber. A refined quality is used for table purposes as a substitute for olive oil. The germs, after the oil is extracted, are sold in thin slabs as corn-oil cake, or, when ground, as germ-oil meal which is used for feeding stock.

Rubber. Strange as it may seem, corn is becoming an important source of rubber, which is made from corn oil by a process known as vulcanizing. The rubber has a coarse texture and mixes readily with rubber made from the rubber plant. It is not so elastic as other rubber, but is useful for buffers, buggy tires and rubber soles, nearly all of which are made from corn rubber.

Starch. Cornstarch is one of the most common and extensive of corn products and many million bushels of corn are used yearly in its manufacture. See STARCH.

Dextrine. Dextrine is made by heating the starch to 280° F. with weak nitric acid. It is used in the manufacture of mucilage and certain kinds of paste and by the manufacturers of glue. The adhesive mixture on postage and revenue stamps consists largely of dextrine.

Glucose. By heating a mixture of cornstarch and dilute hydrochloric or sulphuric acid in a closed steam converter and under a pressure of 30 to 40 lb. to the square inch, glucose is produced. When the glucose is drawn from the converter the excess of acid is removed by chalk, marble dust or soda. Glucose sirup is about half as sweet as corn or beet sirup, but it is extensively used in canning fruits, making preserves and in the manufacture of confectionery and jelly.

Corn Sirup. The sirup now common on the market is prepared by mixing one part cane sirup with nine parts glucose.

ALCOHOL. Alcohol is made by fermentation and distillation. A bushel of corn will produce about 2.7 gallons of alcohol 95 per cent pure. Large quantities of corn are consumed in this way. See ALCOHOL.

CORN COCKLE

PRODUCTS FROM THE COB. Corncobs are not wholly worthless, as was formerly supposed.

Fuel. In the Corn Belt where coal must be hauled some distance cobs are quite generally used for summer fuel. Three tons of cobs are equal to about one ton of dry hard wood.

Cob Pipes. There is a large factory in St. Louis devoted to the manufacture of tobacco pipes from cobs, and in this vicinity a large variety of corn is raised with a view to supplying this factory with cobs.

Corn Down. Corn down is made in dressing the cobs and hollowing them in the manufacture of pipes. It is used in upholstering and in making mattresses.

PRODUCTS FROM THE PLANT. *Paper.* A good quality of paper is made from the pith and at much less cost than paper from wood pulp. This industry has recently started, but it has every prospect of rapid development.

Packing. The pith of the corn stalk is the most valuable material for packing under the armor plate of battleships. If the armor is penetrated, the pith swells quickly when wet and stops the leak. Many acres of stalks are necessary to supply packing for a single battleship.

Guncotton. Guncotton and smokeless powder are also made from the pith. See GUNCOTTON; SMOKELESS POWDER.

New Corn Product. After the pith has been removed, the balance of the stalk and the leaves are ground into a sort of meal that forms an excellent stock food, which finds a ready market in localities remote from the Corn Belt.

The Husks. The husks are used in packing fruits, in making door mats and in filling mattresses.

Corn Cock'le, a sturdy member of the Pink Family brought from Europe probably with seed, for it is chiefly found in the cultivated grainfields. Its hairy stems are straight-branched and tall, so that the flowers reach almost to the top of the growing stalks of grain. The leaves are long and downy, and the flowers, which bloom throughout the entire summer, are handsome magenta blossoms

CORN CRAKE

often having a diameter of one or two inches. The sepals are long and slender and extend from a bladderlike calyx cup above which the broad petals extend horizontally. Corn cockle is variously known as corn campion, corn pink, corn rose, mullen pink and crown-of-the-field.



CORN COCKLE

Corn Crane, or Land Rail, a bird related to the rails. It is about the size of the robin, yellowish-brown above and white below; the flanks are barred with brown and buff. The nest is placed on the ground and is made of grass, dried leaves, etc. Seven to ten reddish eggs with brown and gray spots are laid. It is a common European bird, frequenting grass and corn fields, and is considered a good game bird. It rarely visits the United States.

Corneille, Kor"na'y, Pierre (1606-1684), a French tragic poet, born at Rouen. He was the son of a lawyer and took the advocate's oaths in 1624, serving in minor legal offices until 1650. Pre-

CORNELIUS

ceded by a few plays of less importance, his *Le Cid* appeared in 1636, and this tragic-comedy, despite the arguments it provoked and the ill-advised criticism which was mixed with the good, became the beginning of modern French drama. In construction it is perfect, in that it preserves the unities of time, place and action. In almost all his dramas Corneille is chiefly interested in situations which reveal the workings of an unconquerable will, and his tragedies arouse admiration rather than sympathy and tragic fear. His productions remain celebrated by their excellence and a splendor which has scarcely been equaled. He also wrote *Horace*, *Cinna*, *Polyeucte* and *Rodogune*.

Cor'nel, a name given to some 20 species of shrubs or small trees of the Dogwood Family, 18 of which are well known in North America and which are peculiar from the fact that each of the species may be distinguished by the color of its fruit. Many have edible fruits, but in general the berries are seedy and insipid. The leaves are, with one exception, opposite in position on the stem and are bright green in color. The flowers are small and grow in clusters. The most common varieties are the white-fruited cornel, the purple-fruited cornel, the dwarf cornel, or bunchberry, the Florida cornel, or dogwood, and the cornelian cherry. See BUNCHBERRY; DOGWOOD.

Corne'lia, daughter of Scipio Africanus the Elder, and mother of the Gracchi. She was highly educated and devoted herself to the training of her two boys, Tiberius and Caius. When asked to show her jewels, she introduced her sons. Upon a statue erected after her death was inscribed, "The Mother of the Gracchi."

Corne'lius, Peter von (1783-1867), a German painter, born in Düsseldorf. In 1811 he went to Rome, where he became a member of a brotherhood of German artists studying there, Overbeck, Veit, Schnorr, Ludwig, Vogel and Schadow, whose works were to be the foundation of a new school of German art. With these coworkers Cornelius participated

in the execution of mural decorations until called to Düsseldorf to become head of the academy there. Soon after this he removed to Munich, at the invitation of the Crown Prince Louis of Bavaria, to decorate one of the art galleries; and in 1825 he became director of the Munich Academy. His greatest works are in that city, the frescoes of the Ludwigs-kirche being among the most important mural decorations of modern times. Cornelius was not a great colorist, neither was he possessed of great technical skill, but there is in his compositions a grandeur and nobleness of conception that have exercised a profound influence upon modern German art.

Cornell University, at Ithaca, N. Y. (1868). Under the Federal land grant of 1862, for the support of education in agriculture and the mechanic arts, New York received title to nearly 1,000,000 acres of the national domain. Ezra Cornell of Ithaca, who had accumulated a large fortune, by the gift of \$500,000 secured the location of the institution at Ithaca. It bears his name, but the governor and various other state officers are members of its board of trustees, and the state maintains the veterinary college and the college of agriculture, while a large number of students, representing different legislative districts, receive free tuition.

The university has a superb location, buildings valued at about \$5,000,000, a library of some six hundred thousand volumes and an endowment of seventeen million dollars. It was the idea of Ezra Cornell to found an institution "where any person can find instruction in any study." The following departments are maintained: colleges of law, medicine, agriculture, veterinary medicine, architecture arts, engineering and a graduate school. The university ranks as one of the foremost in America and enrolls about 5500 students, one-fifth of whom are young women. See WHITE, ANDREW DICKSON; SCHURMAN, JACOB GOULD; ADAMS, CHARLES KENDALL; WHEELER, BENJAMIN IDE.

Cor'net, a brass, musical wind instrument of the trumpet family. It consists of a tube ending in a cupped mouth-piece, and fitted with valves and pistons. It has a treble register of two octaves. The fundamental key usually is E flat or B flat. The instrument has a penetrating tone and for this reason is much used in military bands.

Corn Harvester, a machine for cutting corn and binding it into sheaves. The ordinary corn harvester is fitted with exceedingly sharp, slowly-moving knives, whose motion is governed by a balance wheel that maintains a uniformity of speed. The apparatus for binding is much like that of the grain harvester, but makes smaller bundles. Sisal or manila twine is usually used; after being bound the bundles are dropped to the ground away from the uncut rows and are later set up in shocks by hand. One row of corn is cut at a time, by means of the most commonly employed harvesters. See REAPING MACHINE.

Corn Husker and Shredder, a machine for removing the husks from ears of corn and then tearing the husks and stalks into shreds. Those in ordinary use are operated by means of gasoline engines and are known as two-roll machines. The feeder consists of a belt upon which the stalks are spread, and are drawn by means of an endless chain between the rollers. Here the ears are snapped off by means of the alternate ribs and grooves upon one end of the rolls, while the lower end, the husking portion, is alternately grooved and plain, with husking pins at regular distances. The shredder head tears the leaves into strips and separates the pith from the stalk. The most modern huskers and shredders are fitted with screens to sift out any shelled corn that might be in the fodder; a blower, which forces out the shredded fodder; and a cutter, which may replace the shredder head.

Shredding the stalk and leaves prepares them for the use of the stock; there is far less waste of fodder than if fed direct from the shock. The use of silos removes the necessity of shredders.

Corning, N. Y., county seat of Steuben Co., 17 m. n.w. of Elmira, on the Chemung River and on the New York Central, the Erie and the Delaware & Lackawanna railroads. Among the prominent institutions are the Corning Academy and St. Mary's Orphan Asylum. A bridge across the Chemung River connects the city with Knoxville. Corning has extensive manufactures of cut and flint glass, railway supplies, air compressors, terra-cotta goods, building and paving brick, lumber, sash and blinds, etc. Coal is mined in the vicinity. Population in 1920, 15,820.

Corn Laws, a name given in England to the statutes dating as far back as the reign of Edward III which had for their object the regulation of the trade in grains. The first legislative enactment was the prohibition of exportation, an expedient to prevent scarcity in case of emergency. This policy was continued until the reign of Charles II, when import duties upon a sliding scale were first introduced. Such an arrangement not only promoted speculative operations but prevented foreign countries from furnishing grain constantly for the British market. In 1846, Sir Robert Peel, influenced by the Anti-Corn Law League, headed by Bright and Cobden, leading members of Parliament, effected the repeal of the duty on imported grain except the nominal sum of one shilling per quarter. This law was done away with in 1869, leaving the importation free.

Corn Planter, a machine for planting corn. There are several patterns, but the planter most generally used in the leading corn-producing states consists of a long, narrow box mounted upon wheels and containing a circular brush and opening and closing devices, which connect with tubes extending to the ground. The corn is placed in the box, and when the machinery is drawn over the ground, the openings connected with the tubes open and close at regular intervals, dropping four or five kernels of corn, which are covered by a sort of shoe attached to the machine. This sort of a planter is drawn by two horses, plants two rows

at a time and will plant from 10 to 12 acres a day. See CORN.

Corn Sirup. See GLUCOSE SIRUP.

Corn'wall, Barry. See PROCTER, BRYAN WALLER.

Cornwal'lis, Charles, MARQUIS OF (1738-1805), an English general and statesman, born in London and educated at Eton and Cambridge. Entering the army, he was aid-de-camp to the Marquis of Granby during the Seven Years' War, and by 1775 he was a major-general, having, in the meanwhile, entered Parliament and been made governor of the Tower of London. Though personally opposed to the war with America, he came over in May, 1776, with Sir Peter Parker. He was prominent in the engagement on Long Island, and, while pursuing Washington across New Jersey, lost a Hessian detachment at Trenton and was himself defeated at Princeton. He contributed largely to the victory at Brandywine, and later distinguished himself at Charleston, Camden and Guilford Courthouse. Forced into Virginia, he there carried on a spirited but unsuccessful campaign against Lafayette, and, on being entrapped at Yorktown by Washington, Rochambeau and De Grasse, he surrendered his entire army Oct. 19, 1781. With him fell the British cause in the United States, but he was not censured, owing to royal patronage. In 1786 Cornwallis became governor-general of India and commander-in-chief of Bengal. He returned to England in 1793 and became a marquis. Later, 1798, as lord lieutenant, he put down the rebellion in Ireland, and, as plenipotentiary to France, arranged the Peace of Amiens. He was reappointed governor-general of India in 1805. In public life Cornwallis was remarkable for his independence and integrity.

Cor'oner, a county officer in each county of every state, whose duty it is to investigate the cause or manner of death of persons who are slain or who die suddenly without attending physicians who are able to state cause of death, or about whose death there appear to be suspicious circumstances. A physi-

cian who cannot certify to a death from natural causes is required by law to report the case to the coroner's office. The statutes in some states give justices of the peace local jurisdiction in the absence of the coroner. It then becomes the duty of the coroner or justice to impanel a jury of six men and make inquiry which shall ascertain if possible the cause of death. If foul play is discovered the jury will make such report to the coroner with the names of the persons possessing the knowledge of the deed, if the same can be learned, and this fact forms the basis of an indictment of the guilty person or persons, by the grand jury. The arrest of the alleged assailants occurs at once, and this is followed by trial which the Constitution declares shall be impartial and speedy.

Corot, Ko ro', Jean Baptiste Camille (1796-1875), one of the greatest of French landscape painters, born at Paris, the son of a hairdresser. After seven years' apprenticeship to a draper, he began, with his family's encouragement, to study art. In 1827 he exhibited for the first time in the Salon, but it was not until late in life, when academic honors were numerous and pecuniary rewards almost unprecedented, that full recognition of his worth was accorded. Beginning as a formal Classicist, Corot acquired a strong technique and later became a leader of the Romantics and an object of idolatry to younger artists, with whom he was ever genial, jovial and sympathetic. He was the great lyrist of the Barbizon School, as Rousseau was the great epic poet. To him the gentle side of nature made strong appeal, and he transferred to canvas with delicate sentiment the birch, the willow and the wild flowers. Color was the most important element in his pictures, but it was always in a low key; and his landscapes are usually enveloped in a mist or haze. Corot was a gifted musician, and his scenes are permeated with musical and poetic suggestion. His woodlands, peopled with dancing nymphs and lighted with a lovely diffused glow, reveal characteristic moods. His works are to be found in the galleries of Europe,

England and America. The most notable of them are *Orpheus*, *Dancing Nymphs* and those containing less individual titles, such as *Evening*, *Morning*, *Sunset*, *Rest*.

Cor'pora'tion, a public or private association empowered by special legislative action, or under a general statute, to act as an individual, and having a common seal. Its rights and duties are its own and not those of its individual members. Thus it may hold extensive properties, real or personal; but its members as individuals have no control over these. Again, it may owe large sums, but the individual member is under no obligation to pay the debt, and, though its members may repeatedly change, the corporation lives on. The village, city and county are examples of public corporations. These exist for governmental purposes and may be dissolved, or restricted or modified by action of the State Legislature. A private corporation, however, is considered to have a contract with the municipality or state; and it cannot be compelled, against its will, to accept changes in its franchise or charter, unless the charter contains an agreement to accept such changes.

The application of scientific principles to industry made necessary the application of new methods in business. The partnership could not meet the demands. Through the corporation, therefore, the small sums accumulated by thousands of individuals, and useless so long as kept in reserve, have been welded into a powerful and effective instrument for the production of enormous wealth, because any sum from the amount necessary to purchase a single share of stock, to the largest amount which a holder of stock is allowed to invest, can be paid in, each purchaser of stock receiving the number of shares he buys. Most states now permit the organization of corporations under general statutes, and in 1910 it was reported that 865,770 stockholders of railroad and industrial corporations held stock valued at \$8,983,500,000; while it was estimated that not less than 2,500,000 persons in all were then stockholders in live American corporations.

The corporation is organized by the stockholders who meet and choose a board of directors, and these in turn choose the officers and fix their salaries. Each stockholder has as many votes as he owns shares of stock. If he cannot be present at a meeting he may formally assign his vote to another member who acts as his proxy. Those holding the largest amount of stock are chosen directors, and the officers are usually directors who own a majority of the stock. A single person owning 51 per cent of the stock can elect the officers and control the policy of the corporation. The development of corporations was soon followed by the development of trusts; and it became evident that monopolistic control of raw materials, of patented processes or of the means of transportation would make possible the fixing of wages and of prices. To prevent injustice, and thus safeguard the interests of all, state and Federal legislation has been enacted; but the proper regulation of these powerful engines of production has not yet been achieved. See PARTNERSHIP; STOCK; JOINT-STOCK COMPANY; CORPORATIONS, BUREAU OF; TRUSTS; STANDARD OIL COMPANY; UNITED STATES STEEL CORPORATION; SHERMAN ANTI-TRUST LAW; INTERSTATE COMMERCE COMMISSION.

Corporations, Bureau of, a Federal bureau created in 1903 with power to investigate the conduct of all those corporations not common carriers which might engage in interstate or foreign commerce. It is the purpose of the bureau to insure publicity concerning the management of great corporations, and especially of those which, because they control a very large proportion of the raw material needed in a given industry, hold patents under which it may most successfully be carried on, or, for some other reason, have in effect a monopoly and may properly be designated as trusts. Its earliest important reports were those of 1905 upon the so-called beef trust, and of 1906 on the Standard Oil Company. Under the Corporation Tax Law of 1909, a tax of one per cent levied on

the entire net income (over \$5000) of corporations and joint-stock companies, including insurance companies, has necessitated somewhat detailed reports to the Federal Government. The publicity of such corporation reports, supplementing as they do the data collected by the bureau of corporations, is of value to the department of justice in its enforcement of existing Federal statutes, and to Congress in its attempts to protect the interests of the public by further legislation. See CORPORATION; TRUSTS; JOINT-STOCK COMPANY; SHERMAN ANTI-TRUST LAW; INTERSTATE COMMERCE COMMISSION.

Corpus Christi, Tex., a city and the county seat of Nueces Co., 178 m. s.e. of Austin, on Corpus Christi Bay and on the San Antonio & Aransas Pass, Texas—Mexican and other railroads. The city has regular steamboat communication with New Orleans. It is situated in a farming and stock-raising region, of which it is the commercial center. There is a good harbor, and the fisheries are important, large quantities of fish and oysters being shipped. Among the interesting features of the town are the near-by earthworks erected by Gen. Zachary Taylor in the course of his Mexican War campaign. Population in 1920, U. S. Census, 10,522.

Cor'pus Chris'ti (The Body of Christ), **Feast of**, celebrated by Roman Catholics on the first Thursday after Trinity Sunday. With a solemn public procession honor is paid the real presence of Christ, believed to be in the Consecrated Host. In 1264 Pope Urban IV made this celebration obligatory on the Catholic world, and an office for the feast was written by St. Thomas Aquinas.

Correggio, *Kor red' jo*, a name ordinarily given to Antonio Allegri (1494-1534), the Italian painter, the leading representative of what is known as the Lombard School. Little is known of his life in addition to the fact that he was born at Correggio (whence the name) and that he worked there and at Parma. He is one of the first great masters of Italian painting, taking rank with Michel-

angelo, Raphael, Leonardo and Titian. One of the most original geniuses in the history of art, he progressed steadily toward perfection in those qualities which were to be distinguishing characteristics of his style, seemingly uninfluenced by any of his great predecessors or contemporaries. Correggio's peculiar strength lies in his masterly draughtsmanship and in the exquisite color and fine effects of light and shade produced. His greatest weakness is to be seen in the lack of spiritual significance in his work; the solemn, austere and dramatic were unknown to him. But, in spite of this shortcoming, his religious subjects rank among the greatest in the world, being charming in color, rhythm of line, beauty of expression and originality of design. Among them are two representations of the birth of Christ—*Night and Holy Night; The Holy Family, The Marriage of St. Catherine, The Ascension of Christ*, in the cupola of the Benedictine Chapel, Parma, and the celebrated *Ascension of the Virgin*, in the cupola of the Cathedral of San Giovanni of the same city, the last, his greatest work. Correggio also painted a large number of pictures on mythological subjects, which are unsurpassed in conception and in execution. These include *Jupiter, Antiope, Leda* and *Io*.

Correspondence Schools. See SCHOOLS, CORRESPONDENCE.

Cor'igan, Michael Augustine (1839-1902), a Roman Catholic prelate, born at Newark, N. J. He studied at Mount St. Mary's College, Emmitsburg, Md., graduating in 1859. He was one of the 12 who formed the nucleus of the American College at Rome, where he was ordained to the priesthood in 1863. From 1864 to 1868 he was professor of dogmatic theology in Seton Hall College, South Orange, N. J., and afterwards president of that institution. In 1873 he was appointed to the See of Newark by Pope Pius IX, and in 1880 became associated with Cardinal McCloskey, upon whose death, in 1885, he was made Archbishop of New York.

Corro'sive Sub'limate, a highly poi-

sonous compound of mercury and chlorine, technically called mercuric chloride. It is produced by heating mercuric sulphate with common salt. Corrosive sublimate is a white crystalline substance which is readily dissolved in warm water, in alcohol and in ether. It is used as an antiseptic in surgery in washing out wounds, and for cleansing the hands and surgical instruments. It is also used to preserve stuffed animals and botanical specimens, but only in diluted solutions.

An antidote for corrosive sublimate poisoning is the white of egg and milk. See POISON.

Cor'sica, an island in the Mediterranean, a possession of France. It is noted as the birthplace of Napoleon. Its area is about 3368 sq. m. and it is the fourth in size among the islands of the Mediterranean. In physical configuration it resembles Italy rather than France; as a part of its high and rugged mountain systems are the peaks, Monte Cinto, Monte Padro and Monte Rotondo. The ranges are covered with forests famous for their beauty. The vegetation is luxurious and oranges, vines, olives and citrons grow in abundance. Agriculture is not highly developed, for the native inhabitants ignore the natural resources of the island and are not industrious, depending on Tuscany to supply laborers. The principal towns are Bastia and Ajaccio, the latter being the capital and having a population of over 20,000. The lowlands are malarial, but as a whole the climate of the mountainous regions is healthful. Corsica was colonized by the Phœnicians and passed into the hands of the Romans, Goths, the Saracens and the Genoese. The French held it between 1768 and 1794, and after two years' possession by the British it was again returned to France. Population in 1902, 295,590.

Corsicana, *Kor" si kah' nah*, **Tex.**, a city and the county seat of Navarro Co., about 50 m. s.e. of Dallas, on the Houston & Texas Central, the St. Louis Southwestern and other railroads. The manufacturing interests of the city are important, the principal plants being cotton

CORTEZ

gins, cotton compresses, cotton mills, cottonseed-oil mills, flour mills, grain elevators, brickyards, foundries, machine shops and planing mills. In the vicinity are oil wells, and the oil industry is extensive. Here are located the Texas State Orphans' Asylum and an Odd Fellows' widows' and orphans' home. Population in 1920, 11,356.

Cor'tez, Hernando (1485-1547), the conqueror of Mexico, born in Medellin, Spain, of good family. Having studied law for two years at Salamanca, he went to the West Indies in 1504. In 1511 he aided Velásquez in conquering and colonizing Cuba, on the founding of Santiago becoming major of that place, which in 1518 he left for Mexico. In 11 vessels he carried 550 Spaniards, over 200 Indians, a few negroes, 18 horses and some brass cannon, and, on reaching Tabasco, he burned his ships, thus forcing his followers to rely solely on their valor. Having founded Vera Cruz, Cortez set out to meet Montezuma, who reigned in Mexico City, and, by fighting his way, reached the Aztec capital in November, 1519, with a handful of Spaniards and some 6000 native followers. Montezuma received him kindly; but when Cortez assumed the manner of a conqueror, instead of a guest, riots ensued, during which the Emperor was secured by trickery as a hostage and, besides acknowledging vassalage to Spain, was forced to give up a large sum of gold. Later the Mexicans revolted against the invaders, who were driven from the city and were terribly harassed in a six days' flight. However, Cortez reentered the capital on Aug. 13, 1521, after a gallant siege of 77 days. For these exploits he was made civil and military ruler of Mexico and received the title of Marquis. In 1528 he returned to Spain. In 1530 he came back to Mexico, exploring the country northward and discovering Lower California. He died near Seville, Spain. See MONTEZUMA; AZTEC.

Cortland, N. Y., county seat of Cortland Co., 37 m. s. of Syracuse, on the Tioughnioga River and on the Del-

COSSACKS

aware, Lackawanna & Western and Lehigh Valley railroads. A state normal and training school is located here. The city is situated in an agricultural region. Its manufactures include steel nails, motor trucks, trunks, corsets, carriage and auto trimmings, wire and wire cloth, drop forgings, silk, wall paper, etc. Population in 1920, 13,294.

Coshocton, *Ko shok' tun*, Ohio, a city and county seat of Coshocton Co., 70 m. n.e. of Columbus, on the Muskingum River, at the junction of the Walhonding and the Tuscarawas rivers and on the Wheeling & Lake Erie, the Pennsylvania and the Pittsburgh, Cincinnati, Chicago & St. Louis railroads. The city has an elevation of about 824 ft. above sea level and is built on several terraces which command extensive views of the valley and rivers. Bridges cross the rivers and connect Coshocton with the village of Roscoe. The surrounding country is largely agricultural, and the city is an important commercial center. There is a fine public library, numerous churches and good municipal buildings. The city contains wooden novelty works, basket works, machine shops, flour mills, glass factories, manufactories of paper, cast-iron pipe, chinaware and advertising specialties, and a publishing house. Coshocton is an important shipping point for grain, coal, wool and live stock.

Coshocton occupies the site of an Indian town by the same name which was destroyed by the whites in 1781. In 1802 the place was laid out as a town and named Tuscarawas. The present name was adopted and the town made the county seat in 1811. Population in 1920, U. S. Census, 10,847.

Cos'sacks, a people living in southern and eastern Russia near the extremity of the Ural Mountains and in the grassy plains of the River Don. They are a mixed race of Russian and Polish descent, differing from the Russians in manner of life rather than in racial characteristics. Early in the Middle Ages they were a thriving race, of wild and restless habits, courageous, unrestrained by any civilized government and power-

ful on the battlefield. Their form of government was democratic, and the highest office, eligible to any member, was that of ataman, or hetman. There were two important tribes, the Don Cossacks, now the principal tribe and the one which became powerful at the close of the 16th century; and the Cossacks of Little Russia, or the Malo-Russians. The Don Cossacks made Tcherkask on the Don their capital in 1570, and in 1805 built New Tcherkask several miles to the westward.

When the Cossacks joined Charles XII and made war against Peter the Great, they were disastrously defeated and many of their liberties were taken away. They are now considered a military branch of the Russian Government, and because of their superior horsemanship they form an important branch of the Russian cavalry. They pay no taxes, but serve in the army for 20 or 25 years, beginning when but 17 years of age. Their uniform is a rich dark green. The title ataman is now one of the Russian imperial titles. The Cossacks at present number from 1,500,000 to 2,000,000.

Costa Rica, *Kos'ta Re' ka*. See CENTRAL AMERICA.

Cos'ter, Laurens. See PRINTING, subhead *History*.

Cote', Aurele Suzor (1870-), a Canadian artist, born in the Province of Quebec. Originally a church decorator, he went to Paris in 1891, where he studied under Bonnat and Lefebvre. He has exhibited at the French Salon and frequently in Canada, and has won fame by his *The Death of Archimedes*, *Pastourelle* and *Retour des Champs*. In 1908 he was commissioned to decorate the Parliament Buildings, Ottawa, and he has recently painted a portrait of Laurier, *The Landing of Champlain at Quebec* and *The Discovery of Canada by Jacques Cartier*.

Cotopaxi, *Ko" to pak' se*, a volcano of Ecuador, 34 m. s.e. of Quito. It has a regular well-formed crater 2600 ft. in diameter and 19,950 ft. above sea level. It is the highest American volcano that has been recently active; its first recorded eruption occurred in the time of Pizarro, and it was almost continually

active between 1698 and 1768. Numerous less violent eruptions have occurred since 1850.

Cot'ton, the most important fiber plant in the world and a member of the Mallow Family, to which also belong the common mallow and the ornamental hollyhock. The cotton plant, however, because its seeds are surrounded by a silky mesh, like that of the milkweed pod, designed to aid the wind in scattering the seeds, has far outranked its Northern cousins in usefulness to man. Cotton cloth has been made in Eastern tropical countries, notably Egypt and India, for many centuries, and when one stops to think of the many cotton articles in his own personal possession and the many that he daily uses, some idea may be obtained of the world-wide importance of the plant and the amount that must be raised to supply the constant demand.

DESCRIPTION AND VARIETIES. Cotton is naturally a plant of the tropics, and though produced in subtropical countries will not grow where the temperature falls below 60° F. It is for this reason that cotton is inseparably connected with the warm regions of the earth, and in the United States the Southern States alone are concerned in its production. An individual cotton plant resembles the hollyhock in form and manner of growth. It grows from three to ten feet in height, according to the variety, and bears handsome blue-veined leaves and spreading white, red or yellow flowers very similar to those of the rose mallow. The fruiting pod which follows the flowers bears many seeds, all tightly packed in the white, fuzzy mass that furnishes the fiber; thus cotton differs from most fiber plants which produce their fibers in leaves and stem. The fruiting pod of the cotton is called the boll, and, when ripe, its husk splits into three parts, disclosing the foamy seed mass almost ready to be scattered by the wind. There are four chief varieties of cotton plants: the upland, the sea-island, the Egyptian and the tree cotton. The first grows to a height of from three to four feet and is the most commonly raised in the United

COTTON

States. Sea-island cotton, so named because it was found growing on the islands off the coast of South Carolina, is a taller plant and is more desirable because of its longer fiber, or staple; it is, however, more expensive and more difficult to grow than the upland, or short staple, cotton. Egyptian cotton for many purposes outranks both of the above because its fiber has a clear luster, takes dye readily, makes a strong thread, is especially good for mercerizing and is of a soft tan color, which, undyed, produces a clear ecru thread; the plant can be grown at less expense than the sea-island



COTTON

cotton, and, therefore, the bales are sold at a lower price. At present Egyptian cotton is not extensively raised in the United States, but is being experimented with by the United States Department of Agriculture, which has found that it may be grown profitably in those irrigated sections of the Southwest where there are long autumns and no rainfall during the growing period. Tree cotton is found only in the tropics, where it grows for many years and attains the dimensions of a small orchard tree. In the

illustration 1 is the stalk, with leaf and blossom; 2, an opening boll; 3, a single seed with its fibers.

CULTIVATION. Where cotton follows a crop of grain, the ground is plowed and harrowed before being prepared for cotton planting; if, however, the previous crop has been cotton the old ridges are broken up and new ones formed; where possible, this should be done some time before the planting, but one cotton crop follows another so closely that there is but short time between the two. Broadcast plowing, harrowing and re-forming the ridges with a disk cultivator constitute the preparation. The planting may be done with a planter or by hand, the furrow for the seeds having been laid with a shovel plow. About 30 lb. of seed are sown to the acre, which is really much more than is required for a good "stand," but, later, thinning removes the too closely set plants. In the United States, the planting season occurs as soon as the danger of frosts is passed, a period from March to May, according to the locality.

The plants are thinned by chopping out with a hoe a sufficient number of the young plants to leave three or four stalks in hills from 12 to 20 inches apart. Later, these are thinned to one stalk in a hill. The chopping out is done by hand, since no machines have proved satisfactory.

Different methods of cultivating prevail in different sections, but modern cultivators which destroy the grass and weeds are found to be effective. The fields are gone over as soon as possible after a rain, and in dry weather often enough to keep the surface soil loose. The best fertilizer is the cut and plowed-under stalks of the previous cotton crop, which is, of course, applied before the sowing of the seed. Other fertilizers are used at various times, according to the effect desired—before planting, at the time of thinning or during the time of cultivation. Under ordinary circumstances a good fertilizer is equal parts of cottonseed meal and acid phosphates.

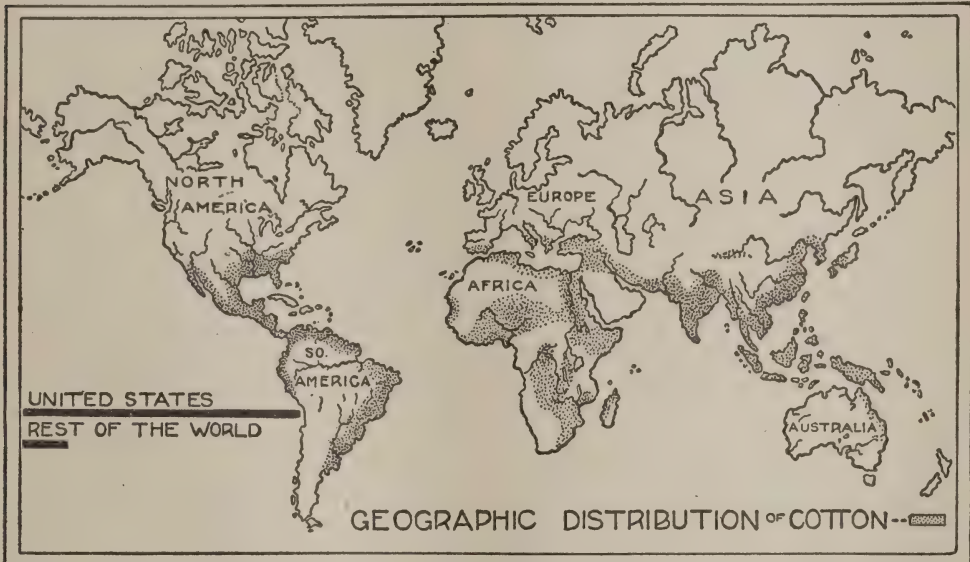
COTTON

Commercial fertilizers are used according to the soil and its needs. See FERTILIZER.

HARVESTING AND GINNING. When the bolls open, a time which varies but is usually during September, the white, soft mass including the seeds is picked by hand from the husks. Various picking machines have been invented, but none has, as yet, proven wholly successful because the bolls are not all ripe at once. Picking continues through October and November and a good hand can pick about 200 lb. of seed cotton in a day. Ordinarily the picking is contracted for

the resulting cake is ground into meal which is used as fertilizer or for feeding stock.

STATISTICS. The United States raises about four-fifths of the cotton crop of the world; Egypt and India produce the most of the remainder. That of the United States supplies both the American and the English mills and averages annually over 12,000,000 bales; of this about 7,000,000 bales are exported to European mills and the remainder consumed in the United States and Canada. The average crop by states in the United States is as follows: Texas, 3,135,000



at the rate of from 50 to 75 cents per hundred pounds.

The seeds were formerly removed by hand, a slow laborious process which was accomplished by one person at the rate of a pound a day. Now by means of one cotton gin, or engine, 5000 lb. of fiber can be separated from the seed in a day. The gin draws the fibers through a network of wires between whose meshes the seeds cannot pass. The fibers are then pressed into bales, generally of 500 lb. each, which are wrapped in burlap and bound with iron hoops for shipment. The seed is also a valuable product; from it cottonseed oil is expressed, while

bales; Georgia, 1,881,000; Mississippi, 1,271,000; South Carolina, 1,244,000; Alabama, 1,230,000; Arkansas, 838,000; North Carolina, 777,000; Tennessee, 340,000; Louisiana, 274,000; Florida, 68,000; all others, 1,074,000; total, 12,132,000 bales. The chief ports of shipment are Galveston, Savannah and New Orleans. Great Britain has the greatest number of spindles, 56,500,000; on the European Continent there are 42,000,000; in the United States, 29,003,000; and in the East Indies, 6,250,000.

COTTON PESTS. The cotton plant is attacked by a number of insects and fungi. The boll weevil alone destroys millions

of dollars' worth of cotton annually, and it is estimated that it rarely leaves more than one-fourth of the crop of an infested field. This weevil invaded the Cotton Belt of the United States in 1892, coming from South America and Central America. It injures the cotton by piercing the young bolls for the pollen and for depositing its eggs in them; the young larvæ, hatching, feed upon the squares and the growing bolls. See COTTON-BOLL WEEVIL.

The cotton worm, or cotton leaf-worm, is the blue-green caterpillar of a gray moth, which during a season lays from 300 to 500 eggs. These moths hibernate in the leaves and refuse of the Southern fields, but during the summer fly farther and farther north, so that the caterpillars are found throughout the Cotton Belt. The "worms" injure the plants by stripping them of their leaves and so destroying the shade and robbing the plant of one of its principal methods of receiving nourishment. The cotton worm was formerly a greater pest than now, for the more hardy weevil is driving it out. On the other hand, the leaf-worm often destroys the breeding places of the boll weevil, so that each proves somewhat of a check to the other. The caterpillar may be killed by spraying the plants during July and August with arsenical poisons or dusting them with Paris green. Arsenate of lead may be sprinkled upon the foliage to the amount of three to five pounds per acre. The cotton stainer, a bug related to the chinch bug, though doing less damage than the other pests, destroys much of the cotton by discoloring the fibers. See INSECTICIDE.

The fungi that attack cotton plants are wilt and black rot, or black heart. The former is a fungus which grows in the soil but enters the roots of the plant, clogging the cells so that the leaves droop and die. It is more apt to be found in sandy soils and is driven out only by destroying all old plants and by rotating crops. Black rot, rust and the shedding of bolls are generally due to unfavorable soil conditions and may be remedied by improving these. Consult United States

Department of Agriculture *Year Book for 1908*. See FUNGICIDE.

HISTORY. Cotton raising for the sake of the fiber is one of the oldest industries. The plant is probably native in the tropical regions of both hemispheres, but was first made use of in India, where for centuries cloth was made from its fibers. When it was introduced into Europe, both the Greeks and Romans immediately saw its value and began raising the plant. It was found growing in the Western Hemisphere at the time of its discovery, but the European mills were still too primitive to require more raw material than could be produced nearer home. During the 18th century great improvement in the mills increased the demand until, with the old method of separating the seed and fibers by hand, the supply was far below the demand. Thus the great revolution brought about by the invention of the cotton gin in 1793 can be imagined (See COTTON GIN). At last the great mills could be kept busy. In 1791 the United States sent to England only 189,000 lb.; in 1860, it produced no less than 1,462,500,000. During the Civil War period the cotton plantations were destroyed, shipping practically stopped and the industry in the United States declined, causing an equal decline in the manufacturing industry in England. Although Egypt and India attempted to meet the demand, the supply was not sufficient until the Southern States could recover from the effects of the war. At present, as the statistics show, the number of pounds produced is over six times that produced in 1860, and the annual crop in the United States ranks second among farm crops, being exceeded in value only by corn. Because of its great usefulness and the labor which it gives to so many thousands in both field and factory, there is little reason to contest Senator Hammond's famous statement, "Cotton is King."

Cotton, John (1585-1652), a Puritan clergyman, known as the "Patriarch of New England," born in Derby, England. He studied at Trinity and Emmanuel colleges, Cambridge, and about 1612 be-

came pastor of the Church of St. Botolph at Boston, Lincolnshire, where he labored for 20 years. In 1633 he came to Boston, Mass., which had been named, in compliment to him, after the town where he worked 'so long. He was soon chosen as teacher of the First Church of Boston, and served in that capacity, under the pastorate of Rev. John Wilson and others, until his death. He became one of the most prominent men in New England in both civic and religious affairs. He published about 50 volumes.

Cotton-Boll Weevil, *Kot' 'n-bole'* *Wee' vil*, a small gray beetle of the Curculio, or Weevil, Family, which does great damage to the cotton crop. It has a long, oval body, with head prolonged into a stout beak, the usual bent antennæ of members of this family and long, strong legs. It may be found in the cotton fields during all seasons when cotton is growing, and it hibernates in the fallen leaves in the field. The hibernating weevils creep from the ground during the first spring days and lay their eggs in the earliest buds and in the bracts, or squares, surrounding them. The infested squares immediately fall to the ground, and the larva goes through its course of development there until, in about four weeks, it emerges a full-grown beetle ready to deposit its eggs in the now swelling bolls. The bolls which are attacked do not fall, but shrink and produce no cotton. As there is a constant succession of generations from earliest spring until the severest frosts, the number becomes great and the damage they do is incalculable.

The United States Government has appropriated much money to the study of this insect and to means of accomplishing its extermination. By application to the United States Department of Agriculture, the results of their investigations may be learned. The most notable suggestions which are made for exterminating the pests are: the removal of the fallen squares from the fields; less close planting of the rows; destruction, as far as possible, of infested bolls; a sacrifice of the "volunteer" crop upon which the

beetles first deposit their eggs; deep plowing of the field in November or later to remove the old leaves and stubble in which the beetles hibernate; and the use of poison sprays (arsenate of lead, one pound in 50 gallons of water) when the earliest buds are forming. Turkeys and quail are said to be the only natural enemies of the boll weevil, and they are not extremely destructive of the pest. See INSECTICIDE.

Cotton Gin, *Jin*, an abbreviation of cotton engine, used to denote a machine for separating the lint, or fiber, of cotton from its seed. It was invented by Eli Whitney in 1793, and his original machine consisted of a hopper over a wooden cylinder, into which were driven spikes bent into hooks, like the teeth of a saw. The points of these hooks passed between vertical rows of wires stretched tightly on a frame, and as these teeth were brought around by the revolving of the cylinder, they would pick up the cotton fiber and tear it away from the seed; a revolving brush removed the lint from the teeth and blew it through a flue into the baling room. The modern cotton gin is made on the same principle, except that it uses circular saws, known as gin saws, with very fine teeth. These run through a series of curved, cast-iron ribs instead of the wires on the original gin. Cotton gins were formerly fed by hand, but now automatic feeders are employed which take out the dirt, trash, twigs, etc., found in the cotton. This prevents injury to the fiber, and saves wearing out the gin saws. See COTTON; WHITNEY, ELI.

Cot'tonwood''. See POP' LAR.

Couch Grass, a creeping weed of the Grass Family, which is extremely troublesome because of its spreading habits and speedy growth. The leaves are long and somewhat hairy, generally rough above. The flower stalk is short and bears only five or six flowers, but as the plant grows both from seeds and root-stock, it multiplies rapidly. A smooth variety is found along the shores of the Great Lakes, and a species called dog's couch grass, with more nearly erect

stems, grows from Delaware west to the Mississippi.

Coues, Kous, Elliott (1842-1899), an American scientist and ornithologist, born at Portsmouth, N. H., and educated at Harvard Medical School. In 1863 he became surgeon in the United States army, from 1873 to 1876 he was surgeon and naturalist to the Northern Boundary Commission, and henceforth, until 1880, he was secretary and naturalist to the United States Geographical Survey of the Territories. He subsequently devoted himself to scientific pursuits. His *Key to North American Birds* has exercised vast influence. Others of his works are *Field Ornithology*, *Birds of the Northwest*, *Birds of the Colorado Valley* and *New England Bird Life*.

Cougar, Koo'gar. See PU' MA.

Coulomb, Koo lom', the practical unit of quantity of electricity. The quantity of electricity delivered by a current of electricity is determined by two factors, the current strength and the time during which the current flows. Mathematically, the quantity expressed in coulombs equals the product of the current expressed in amperes by the time expressed in seconds. When a current of electricity is sent through a solution of silver nitrate in water, .001118 gram of silver will be deposited on the cathode for each coulomb of electricity that passes. The international ampere is defined as a current of such a strength that it will deposit the above amount of silver in one second; that is, an ampere is equal to one coulomb per second. See ELECTROLYSIS.

Coulomb's Law, a law concerning the forces of attraction or repulsion exerted by electrified bodies on one another. It states that the force between two charged bodies, provided they are small compared with the distance between them, is inversely proportional to the square of the distance between them and directly proportional to the product of the electrical charges on them. The law was first studied and proved experimentally by the French physicist Coulomb in 1784. See ELECTRICITY.

Coulter, Kole' ter, John Merle (1851-), an American botanist, born at Ningpo, China. He is a graduate of Hanover College (Ind.), and has occupied positions in Hanover College, Wabash College, Lake Forest University and the University of Chicago. In the latter institution he still holds the position of professor and head of the department of botany. He has done much practical botanical study, and is special botanical agent for the United States Department of Agriculture. Mr. Coulter is the author of many botanical works, among which is a popular textbook of botany.

Coun'cil Bluffs, Iowa, a city and county seat of Pottawattamie Co., opposite Omaha, Neb., on the Missouri River and on the U. P., the C. B. & Q., the C. M. & St. P., the C. R. I. & P., the C. G. W., the I. C., the Wabash, the C. & N. W. and M. P. railroads. The city is an important railway center and is situated in the heart of a great agricultural, horticultural and stock-raising region. Electric railways connect with Omaha and South Omaha and many near-by suburban places in the Missouri Valley. The river is here spanned by three railway bridges, and the city proper stretches back to the bluffs, a distance of over six miles.

PARKS AND BOULEVARDS. The streets are wide, substantially paved and lined with beautiful shade trees. There is a good park system, the largest being Fairmount Park, which commands fine views of the city and the river. Other parks include Bayliss and Electric parks and a well equipped tourist camp. Lake Manawa, is about three miles from the city. There are many handsome residences.

PUBLIC BUILDINGS. The noteworthy structures include the Auditorium, Federal Building, Masonic Temple, the Merriam, Rogers and Wickham Block, a courthouse, banks, theaters, Union Pacific Transfer Building, a city hall and 42 churches and several moving picture theaters.

INSTITUTIONS. The educational insti-

tutions include 2 high schools, public and parish schools, a Carnegie library, St. Francis and Our Lady of Victory academies, St. Joseph's and St. Peter's schools, St. Walburga's Convent, Boyles Iowa College and the Puryear Commercial College. Among the benevolent and charitable institutions are the Jennie Edmundson Memorial, Mercy and St. Bernard's hospitals and the Christian Home Orphanage. The Iowa State Institution for the Deaf is located several miles southeast of the city.

INDUSTRIES. Council Bluffs is an important trade center and distributing point, and the city contains large cattle yards, grain elevators and manufactories of agricultural implements, lubricants, fire extinguishers, wire fencing, wagons and carriages, brick and tile and railway-shop products, cold storage and ice factories. There are large shipments of farm products, grain, fruit and live stock.

HISTORY. Near the site of Council Bluffs in 1804 Lewis and Clark held a conference with the Indians, hence the name. In 1846 the Mormons established a settlement here and called the place Kaneshville. In 1852 they abandoned the place for Salt Lake City. The name was changed to Council Bluffs in 1854. An amended city charter was granted in 1857. Population in 1920, 36,162.

Counterfeiting, *Koun' ter fit'ing*, the making of a facsimile of any piece of genuine money, paper or coin, issued by a government, or the production of any article in imitation of another with intent to secure the use of the false rather than the genuine. Trade-marks have been adopted to prevent the latter. In all great commercial countries, making or dealing in counterfeit money is punishable by severe penalties, and long terms in prison the fate of counterfeiters.

Courland. See LETVIA.

Court, a word now chiefly used as a general term for judicial tribunals. The systems of courts differ among different modern nations, but their general powers and constitutions are the same, their acts, in most cases, being independent of all other authority and their decisions re-

garded as final. The last judicial act of an English king, if such it can be called, was that by which James I settled the dispute between the Court of Chancery and the Court of Common Law. Since the establishment of Parliamentary government the courts have taken their law directly from Parliament and the king is merely connected with them indirectly as a member of the legislative body. The king's name is still used, however, in this as in other departments of State action.

The growth and gradual increase of the jurisdiction of law courts has marked step by step the advance of civilization, the increase of personal liberty and the rights of individuals to hold property and maintain suits for the enforcement and preservation of their civil liberties. Almost every gain made in these directions by the courts of Great Britain has sprung from the acquisition by the people of some great charter enlarging their liberties.

ENGLISH COURTS. Judicial reforms were brought about during the reign of Edward I, when the King's Court was divided into three distinct tribunals, the first being the Court of Exchequer, which had charge of the royal revenues; the second the Court of Common Pleas, for the trial of suits between private persons; and the third the Court of King's Bench, which had jurisdiction in criminal cases. The judges of these courts were appointed by the king and it was not until the tenure of judicial office was made independent of the king that the powers of the courts of law and equity were firmly established. It was not until these reforms were brought about that the courts were modified under the Judicature Act of 1875, when the superior courts of England, including the courts of Chancery, Admiralty, Probate and Divorce and the Bankruptcy Court of London, were consolidated in one Supreme Court consisting of two divisions, called High Court of Justice and Court of Appeals. In addition to these there are many inferior courts of criminal and civil jurisdiction.

UNITED STATES. The Federal judicial

system of the United States is independent both of Congress and the executive. It consists of the Supreme Court, the Circuit Courts of Appeal, the District Courts, the Court of Claims, the courts of the District of Columbia and the Territorial Courts.

STATE COURTS. The judicial department of a state consists of one Supreme Court, a Circuit or County Court for each county and below these municipal and justice courts. To relieve the Supreme Court there are in some states one or more Appellate Courts which decide cases carried on appeal from the Circuit or County Courts. See **SUPREME COURT**; **CIRCUIT COURT**; **DISTRICT COURT**.

Court Fool. See **JESTER**.

Court of Claims, a court established in 1855 which has jurisdiction of money claims of individuals against the United States Government. It consists of a chief justice with a salary of \$6500, and four associates with a salary of \$6000 each. This court can also be called upon to determine claims which may be referred to it by Congress. Should the judgment of the court be in favor of the government, it must be filed in the office of the clerk of the proper District or Circuit Court of the United States, be a judgment of such court and be enforced the same as other judgments. Should judgment be found in the claimant's favor it is provided that the sum found due shall be paid out of any appropriation made by law for the payment of private claims, on presentation to the treasury of a certified copy of such judgment. In cases where the amount in question exceeds \$3000 an appeal may be taken to the United States Supreme Court at any time within 90 days after judgment. The jurisdiction of the court does not extend to any claim growing out of any treaty with foreign nations, or Indian tribes, unless such claim was pending in the court Dec. 1, 1862. The court is required to hold one session annually, commencing on the first Monday in October.

Courts'-Mar'tial, courts established by a government to have jurisdiction in the army and navy. The courts of this

character in the United States were established by Congress according to constitutional provisions. They are of four kinds: general, summary, garrison and regimental. The general court-martial has jurisdiction over every person subject to military law and for every offense. It is the only court that is permitted to try a commissioned officer, and it also tries the most serious offenses committed by enlisted men. This court must not contain less than five officers nor more than 13, and must contain 13 when so many can be assembled without injury to the service. The court may be called by the president; by any general officer commanding an army, a territorial division or department; or by a colonel commanding a separate department. Any officer qualified to call a court-martial is also qualified to appoint a judge-advocate for the same, who prosecutes in the name of the United States, and under certain circumstances acts as counsel for the prisoner.

The summary court-martial tries enlisted men, but not for capital offenses, and it may not try a commissioned officer. This court is composed of a single officer, and its decisions are subject to higher authority. The garrison court-martial is composed of three members and a judge-advocate, all commissioned officers. It is usually assembled to try noncommissioned officers who object to trial by the summary court. The regimental court-martial is made up the same as the garrison court, except that all members must belong to the regiment. It may be appointed by any officer commanding a regiment or corps, and has jurisdiction in the same regiment or corps where it is appointed.

Cousin, *Koo'sahn'*, **Victor** (1792-1867), a French founder of an eclectic School of Philosophy. When 23 he became deputy professor of philosophy at the Sorbonne, after two years visited Germany, acquainted himself with German idealistic philosophy and four years later resumed teaching. Subsequently he became a peer, and in 1840 was appointed minister of public instruction, in which

COUTLEE

capacity he greatly influenced primary education. Cousin is remembered for the felicity with which he expressed the philosophy of predecessors and contemporaries and for a translation of Plato. His historical works are mainly 17th century biographies.

Cout'lee, Louis William (1851-), a Canadian public official, born in the Province of Quebec. He was educated at McGill University, and from 1882 to 1887 was deputy attorney-general and law clerk of the assembly in Manitoba. In this capacity he organized and reconstructed various departments of the provincial administration, and was instrumental in introducing the Torrens System of land titles registration. For three years he was registrar-general and in 1895 he was appointed assistant reporter of the Canadian Supreme Court. Lieutenant-Colonel Coutlee joined the militia in 1866 and has been in active service three times.

Cov'erdale, Miles (1488-1568), the translator of the Coverdale Bible, born in Coverdale, England. He was educated at Cambridge and entered the priesthood, but later embraced the doctrines of the Reformation. His version of the Bible, brought out in 1535, was the first complete translation of the Bible printed in the English language. In 1539 was issued the "Great Bible," so called on account of its size; and in 1540, a second edition of this appeared, generally known as Cranmer's Bible, because Cranmer wrote a preface for it. After a sojourn of eight years on the Continent, Coverdale became royal chaplain and in 1551 was appointed to the See of Exeter. The accession of Mary in 1553 resulted in his imprisonment and subsequent departure from England, and he did not return until Elizabeth became queen. Coverdale was the author of several tracts favorable to the Reformation and he translated various works of a similar nature.

Covington, Ku'ing tun, Ky., a city and county seat of Kenton Co., at the confluence of the Ohio and Licking rivers and on the Louisville & Nashville, the

COVINGTON

Chesapeake & Ohio, a branch of the L. & N. and other railroads. The city is opposite Cincinnati, of which city it is a popular residential suburb. A suspension bridge 2250 ft. long and costing \$2,000,000 crosses the river at this point. There is also a Chesapeake & Ohio railway bridge. The city is connected by bridges with Newport across the Licking River. There is an excellent interurban electric system, and steamboat lines connect with all Ohio and Mississippi river ports. Covington is an important trade center for an extensive district engaged in stock raising and agriculture.

PARKS AND BOULEVARDS. The city occupies an area of over two square miles and is built on a beautiful plain partly surrounded by hills. The streets are wide, well paved and lighted, and there are numerous handsome residences. The city is the seat of a Catholic see. Devou and Goebel are the largest of the city parks, with a total of about 600 acres.

PUBLIC BUILDINGS. The notable buildings include a courthouse and city hall combined, the Federal Building, a public library, a Y. M. C. A., substantial business blocks, theaters, banks and a number of churches, including the Catholic Cathedral, one of the finest church edifices in the United States, a replica of the Notre Dame in Paris.

INSTITUTIONS. Among the educational institutions are the Academy of Notre Dame, St. Joseph's School for boys, public and parochial schools, a central high school and the William Grant High School for colored pupils. The benevolent and charitable institutions include St. Elizabeth Hospital, the German Orphan Asylum, a Protestant children's home, a home for aged women, a Wayfarers' Rest and a county sanitarium for tuberculosis patients.

INDUSTRIES. Covington has important industrial interests, which include extensive rolling mills, pork-packing establishments and by-products, large manufacturing of cotton goods, structural iron and steel, cordage, cigars, woolen goods, ceramic tiling, X-ray machines, artificial ice and foundry and machine-shop

products. A fine farming district surrounds the city and quantities of vegetables, fruit, hay and grain are raised. The dairying interests are extensive.

HISTORY. The first settlement was made in 1812, but the town was not platted until three years later. It was named in honor of Gen. Leonard Covington. A city charter was granted in 1834. Central Covington was annexed in 1908, Latonia in 1909. Pop. in 1920, 57,121.

Cowberry. See HUCKLEBERRY.

Cow'bird'', a bird of the Blackbird Family. The cowbird is unique among the birds of America in its breeding habits; no nest is made and the 8 to 12 brown-spotted eggs are laid in the nests of such birds as the yellow warbler, the bluebird or the wood thrush. Usually the nest chosen is that of a much smaller bird and the young cowbirds soon crowd out the young of the bird that built the nest. The foster parents do not usually seem to be aware of the deception, but care for the stranger as well as for their own offspring. As many as three eggs have been found in the nest of a wood thrush. However, the usual number is one. Frequently, if no nest is at hand, the egg is dropped on the ground and sometimes even eaten. The bird is polygamous and seems to have lost all maternal instincts. The male cowbird may be known by its iridescent black plumage and brown head and breast. The female is uniform brownish-gray. In size, the birds are a trifle smaller than the robin.

These birds receive their name because of their association with cattle in the pasture, where they watch for the insects disturbed by grazing. In the late summer and fall, the cowbirds collect in flocks of 15 or 20, and fill the air with their harsh, gurgling whistles. They spend the winter in Mexico.

Cow'ley, Abraham (1618-1667), an English poet, born in London. He studied at Westminster School, Cambridge and Oxford, wrote poetry at an early age and directed some of his satires against the Puritans. As a loyal Royalist he followed the wife of Charles I when she fled to Paris in 1646, and acted as her

correspondent with the King. On Cowley's return, at the time of the Restoration, he devoted himself to writing poetry. He enjoyed popularity in his own day, but his artificial poetry finds few readers at the present time. His best works are *Pindarique Odes*, *Davideis*, *The Mistress* and elegies on Harvey and Crashaw.

Cow Parsnip, a summer flowering herb of the Parsley Family growing in rich soil in the Northern States. It is a stout, erect weed, sometimes attaining a height of four feet, and having a tough, hairy stem. The leaves are large and divided, with the little leaflets also lobed. The flowers grow in broad, spreading clusters, each little blossom being on a slender, straight stem, and having a five-parted calyx cup, five white, flat-spread petals and five stamens. The fruit is a large oil-bearing seed surrounded by a thin wing which splits with the shell when the seed is ripe. The whole plant is unpleasantly scented and thus is often wrongly called masterwort, because that plant has a similar odor.

Cowpens, Kou' pens', **Battle of the**, a battle of the American Revolution, fought in Spartansburg County, S. C., a few miles from King's Mountain, Jan. 17, 1781. Colonel Tarleton with a force of 1100 British attacked 1000 Americans under Morgan. The English had the advantage till simultaneously charged on both flanks; then they fled in utter rout, all but 270 being killed or captured. The Americans lost 12 killed and 61 wounded. Morgan and Tarleton had a terrible personal combat during the engagement. According to Fiske, the Battle of the Cowpens was "the most brilliant battle in point of tactics in the War for Independence."

Cowper, Koo' per, William (1731-1800), English poet, born in Great Berkhampstead, Hertfordshire. On the completion of his studies at Westminster School, Cowper took up law and was admitted to the bar in 1754. Always of a timid, nervous nature, the dread of preparing for a clerkship made him violently insane, and he attempted suicide. He

was thereafter subject to periods of depression, religious melancholia and actual insanity. In 1767 he took up his abode in the village of Olney, where his most important literary work was done. In 1779 appeared the *Olney Hymns*, of which the one beginning *Oh! for a closer walk with God* is still a favorite. A volume of secular verse was published in 1782, and in 1785 came *The Task*, a poem in six books, and *The Diverting Ride of John Gilpin*. These latter poems gave him a national reputation. A translation of Homer was completed in 1791. In 1794 he became insane again and his last years were full of mental suffering.

Cowper's place in English literature is an important one, though he is not one of the foremost poets of his country. He came between the age of the artificial poetry of the Pope type and the new period made glorious by Wordsworth and his contemporaries. Cowper's poetry was characterized by a new spirit; it expressed the feeling for nature and love of animal life that was common to later poetry. Unlike many English poets he had a gift of humor, and he ranks among the great letter writers of his country. Some of his poems, such as *To Mary, On the Receipt of My Mother's Portrait* and *On the Loss of the Royal George*, are among the popular poems in the English language.

Cow'slip", or **Primrose**, a low herb of the Primrose Family, characterized by having its leaves and flower stems all springing from the root. The English, or true cowslip, has small, orange-yellow, cup-shaped flowers with rather coarse, hairy leaves never rising as high as the flowers. This species, in many variations, is often found in cultivation. The American cowslip, often called "shooting star," bears pale, pink-purple flowers, which have long tubes with the five lobes sharply bent back. The stamens protrude in a close cluster and give the flowers the pointed appearance which accounts for its local name. Cowslip is a much abused term, being wrongly applied to the following plants: evening primrose, lungwort, marsh marigold, two-

leafed Solomon's seal, wood anemone, and to all buttercups.

Cow Tree, or **Milk Tree**, a small South American tree of the Nettle Family, having milky juice which, in taste, resembles the milk of the cow. Incisions are made in the trunk from which the juice is allowed to run; it is then collected in much the same manner as the sap from other trees. The juice is very nourishing and when allowed to coagulate is made into a nutritive food product.

Cox, Kenyon (1856-1919), a distinguished American mural and figure painter, born at Warren, Ohio. After studying at Cincinnati and Philadelphia he went to Paris, where he was a pupil of Carolus Duran and Gérôme. Returning to America, he became founder of the Society of American Artists. Among his important mural decorations are those of the Congressional Library at Washington, in Bowdoin College and in the Minnesota State Capitol at St. Paul. His easel pictures include *An Eclogue* and a portrait of the sculptor Augustus Saint-Gaudens, which won a medal at the Paris Exposition (1900). Cox is a good draughtsman, with a fine sense of form. His *Old Masters and New* is an excellent volume of art criticism.

Cox, Palmer (1840-), a Canadian artist and author, born at Granby, Quebec. After graduation at Granby Academy, he removed to San Francisco, where he contributed to periodicals. He settled in New York City in 1875. His writings, which are numerous, are illustrated by himself. Cox is the creator of one of the most famous figures in recent illustration, known as the "Brownie," a humorously grotesque little figure that has enjoyed the widest popularity. Among the author's works are *Queer People with Wings and Things*, *The Brownies at Home*, *The Brownies in Fairyland*, *The Brownies in the Philippines* and *How Columbus Discovered America*.

Cox, Samuel Sullivan (1824-1889), an American statesman, born at Zanesville, Ohio. He graduated at Brown University in 1846, studied law and became a journalist. Removing to New

York City in 1866, in 1868 he was elected to Congress, where he served a number of terms, aggregating 17 years. He was minister to Turkey in 1885-86. He was an able debater and a genial humorist. Early in life he wrote a flowery description of a sunset for one of his journals, and was known thereafter as "Sunset Cox." Among his publications are *Eight Years in Congress*, *The Buckeye Abroad* and *Three Decades of Federal Legislation*.

Coyne, James Henry (1849-), a Canadian public official and writer, born in Ontario. He was educated at Toronto University and until 1889 practiced law at St. Thomas, Ontario. Later he became registrar of deeds, County Elgin, and local master of titles. He organized and was the first president of the Elgin Historical and Scientific Institute and reorganized the present Ontario Historical Society. Among his works are *The Country of the Neutrals, from Champlain to Talbot* and *The Talbot Papers*.

Coyote, *Ki o' te*, a wild member of the Canine, or Dog, Family, living in the open plains or prairies of America from Canada south through Mexico. On account of its relationship to the wolf, it is often called the prairie wolf, but is smaller than its fierce cousin and less ferocious, though it has the same stealthy cunning and the same tendency to travel in packs. The coyote has a sharp, pointed nose, erect ears, a slim body and a somewhat bushy tail. In color it is a tawny or reddish-gray, but the long hairs on the back and the end of the tail are tipped with black. Its home is in burrows made by itself or appropriated from badgers or prairie dogs. Coyotes are carnivorous and prey upon such animals as rabbits, squirrels and even fawns of deer, and are of some use to ranchmen in this respect, though their depredations upon poultry yards and lamb folds cause them to be more dreaded than desired. The most distinguishing characteristic of coyotes is their continuous, snapping bark, which may be heard when the pack is prowling about the ranch or galloping

across the plains. This cry has given them the name barking wolves.

Crab, a popular name given to a group of Crustaceans. All are aquatic animals living in either salt or fresh water, and many species are highly prized as food. They may be recognized by their broad bodies, which have large gill chambers on each side. The head and trunk are united and are covered by a stiffened covering called the carapace. This part of the body is made up of 13 or 14 segments, each of which bears a pair of jointed appendages; the first two pairs are antennæ; the next six are organs of crushing and are connected with the mouth parts. The remaining pairs are seven-jointed and are prehensile or of use as organs of locomotion. In many species one or more pairs of the appendages are lacking or are at least rudimentary. In other species the eyes are lacking, although most crabs have one or two pairs which may or may not be borne upon stalks. In shore-frequenting crabs, one pair of the antennæ are elongated and may be placed together in such a manner as to form a tube, through which water may be drawn as the crab lies buried in the sand. Crabs, like lobsters, pass through a molting season, during which time their shells, outgrown by their bodies, are slit and cast off. The crab is in a helpless condition until the new covering has developed. This process, known as ecdysis, is repeated frequently until the crab becomes mature and no longer needs to change its shell.

The hermit crab belongs to a family of small shell-less crabs, which, being unprotected, make their homes in empty coiled shells. If unable to find empty shells of the necessary size, they are not averse to emptying one by the simple process of eating the owner. In place of the painful ecdysis which shelled crabs go through, the hermit crabs, when grown too large for their shells, merely move to a larger habitation.

Other common species of crab are the beckoning, or fiddler, crab, which runs actively along the beach and seems to beckon with its much-enlarged right

mandible to the retreating tide; the spider crab, which resembles the spider in form; and the porcelain crab. Crab fishing is a highly important industry in those sections where crabs are much desired as a food. See LAND CRAB; HORSE-SHOE CRAB.

Crab Apple, a small orchard tree of the Rose Family, from which the apple is said to have been developed. It bears small applelike fruits that are used chiefly for preserves and jelly, but, unlike apples, are not especially prized for eating out of hand. The crab-apple tree is generally smaller than most apple trees, but the manner of growth, leaves and flowers are very similar. There are several varieties, but the fruit is not shipped in any quantity beyond the regions in which it is grown.

Crabbe, Krab, George (1754-1832), an English poet, born in Aldeburgh. He was unsuccessful as a physician, often suffering hunger in his inability to earn a living; and not until he applied to Edmund Burke for assistance did he succeed in finding a publisher for his manuscripts. Through the influence of Burke he became a clergyman. Crabbe belongs to the group of poets who were forerunners of the movement led by Wordsworth. His poetry, which is characterized by originality, realism, homely simplicity and keen knowledge of human character, did good service in departing from the artificialism of the 18th century. Best known is *The Village*, which was followed by *The Borough*, *Tales in Verse* and *Tales of the Hall*.

Cracow, Kra' ko, an ancient city of Poland and its capital from 1320 to 1609. It became a free republic in 1815 and remained in this condition until 1846 when, upon the partition of Poland, it became a city of Austria of the crownland of Galicia. It is situated upon the Vistula, 158 m. s.w. of Warsaw, and has an interesting Gothic cathedral, an ancient castle now used as barracks, a university of some note and an excellent academy of sciences. A statue of Kosciuszko, of heroic size, stands upon a hill near the city. Cracow exports grain,

salt and cattle, and manufactures leather, machinery and chemicals. Population, 152,000.

Crad'dock, Charles Egbert. See MUR-FREE, MARY NOAILLES.

Cradle of Liberty, a name applied to the city of Boston because during the colonial period it was the storm center of agitation which ended with the Revolutionary War. The term is also applied to Faneuil Hall in Boston, which was the general meeting place of the New England colonists during the same period.

Craik, Krake, Dinah Maria (1826-1887), better known by her maiden name of Mulock, an English novelist, born at Stoke-upon-Trent. About 1846 she went to London and began writing stories for children. Her novel, *John Halifax, Gentleman*, enjoyed wide popularity and was extensively translated. Imagination, depth of feeling and a high seriousness of purpose are characteristics of all her work, but none of her later writings equaled this favorite, which appeared in 1857. She wrote lyrical verse and interesting narratives of her tours in Ireland and Cornwall. In 1864 she married Mr. G. L. Craik of the Macmillan & Company house. Her other writings embrace *A Life for a Life*, *The Ogilvies*, *Olive*, *The Head of the Family*, *Agatha's Husband* and *A Woman's Thoughts About Women*.

Cran'berry, a wild or cultivated member of the Heath Family grown for its fruit. In its native state the cranberry is a marsh-growing shrub with branched stems which rarely attain a height of three feet and which may stand erect or may lie prostrate along the ground. The leaves are oval with smooth or crinkled edges and are generally quite small. The flowers have an insignificant, four-parted calyx cup, and a pinkish corolla whose four lobes are flatly bent back. The flowers grow on slender stems which proceed from the axils of the leaves. The fruit, which is a crimson or purple berry, smooth but strawberrylike in shape, ripens in October. Those varieties which bear sweet berries are cultivated because

of the fruit, which in the United States is widely used for desserts. Cranberry bogs or swamps are cared for in the Northern States and the crops gathered for shipment to the large cities, where the berries are much prized. A European cranberry, known here as the small cranberry, is cultivated in England. See GUELDER-ROSE.

Crane, a mechanical contrivance for lifting, moving and placing heavy weights. Cranes are operated by hand, by steam or by electric motors. The common type of swinging crane consists of an upright post, revolving on a pedestal and provided with a projecting jib, at the upper end of which is a sheave through which wire hoisting ropes are run. A windlass is fixed near the pedestal, either on it or on the motor. The ropes are coiled and uncoiled on the drum of the windlass to raise and lower the weights, while the jib is swung around in the desired direction to locate the material hoisted.

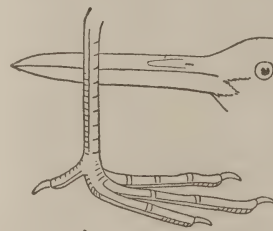
A traveling crane consists of a heavy frame containing the hoisting apparatus, and supported at each end upon trucks, which rest upon the rails resting upon the top of the walls forming the sides of the building, and upon which the crane can travel from one end of the building to the other. The hoisting apparatus can also move from one end of the frame to the other, so that by the combined motion of the frame and the hoisting apparatus an object can be lifted or let down at any point on the floor. Hoisting cranes are employed in works where it is necessary to lift and move objects having great weight, such as foundries, locomotive works and stone works. Some of these cranes will lift the heaviest locomotive as easily as a child can lift a ball.

Locomotive cranes have a steam hoisting engine with two or more drums employed, with a post from which projects a jib provided with suitable sheaves and block and tackle, all mounted on a truck running on rails, and which is so arranged that the entire lifting device can be turned completely around. This crane

is used for various purposes, chiefly on railroads for removing wreckage from the tracks, hoisting locomotives, etc. See DERRICK.

Crane, the name given to a family of birds with long neck and legs and powerful wings. The cranes fly in large flocks during migration, the usual form resembling the arch of a capital A, like that of the wild geese. Cranes are represented by a number of species, which are found in most parts of the world. Four species live in the United States.

WHOOPIING CRANE. This is one of the best-known species. Its length is over four feet; the plumage is white, the



primary feathers with their coverts being black. The naked crown and cheeks are covered with stiff, black bristles. The nest is made on the ground,

CRANE'S HEAD AND FOOT

usually in a marsh, and contains two eggs, spotted with brown and gray. This crane ranges in eastern America from Great Slave Lake to Mexico, wintering in the latter country. It is remarkable for the complicated turns of the windpipe in the breastbone, which enables the bird to emit its whooping cry, whence the name, whooping crane.

SANDHILL CRANE. This crane is somewhat smaller and is gray instead of white. This species frequents open stretches of country, where the birds cannot easily be approached unobserved.

Crane, Frank (1861-), an American clergyman and author, born in Urbana, Ill., and educated at the Illinois and Nebraska Wesleyan universities. In 1882 he was ordained to the Methodist Episcopal ministry. From 1896 until 1903 he preached in Chicago, and in the latter year accepted a call to the Union Congregational Church, Worcester, Mass. In 1909 he became a lecturer for the Woodlawn Sunday Afternoon Club, Chicago. Dr. Crane is an eloquent speaker and a vigorous and interesting

writer. Besides contributing to various newspapers and periodicals, including the *Hearst papers*, the *Chicago Tribune* and the *Ladies' Home Journal*, he has written, among other works, *The Religion of Tomorrow*, *Human Confessions* and *God and Democracy*.

Crane, Walter (1845-1915), an English artist, born in Liverpool, the son of Thomas Crane, the miniaturist and portrait painter. The family removed to London in 1857, where the boy was apprenticed to the wood engraver, William James Linton, in whose shop he had opportunity to study closely the works of contemporary and Renaissance masters that passed through his hands. *The Lady of Shalott* was exhibited at the Royal Academy when the artist was only 17 years of age. His first work in illustration, the chief outlet of his genius, was for a series of toy books published in 1864. Then followed other similar series, *The Frog Prince*, *the Baby's Opera*, *The Romance of the Three R's*, *The First of May*, the beautiful *Household Stories from Grimm* and *The Wonder-Book* of Nathaniel Hawthorne. His finest decorative work in book illustration is Spenser's *Faerie Queene* and the *Shepherd's Calendar*. He collaborated with William Morris in the decoration of *The Story of the Glittering Plain*, and, like Morris, has been active in the socialist movement, furnishing cartoons for socialist organs and bringing art into the daily life of the masses. He also has been an active worker for the Art Workers' Guild and for the Arts and Crafts Exhibition Society, which he founded in 1888.

Crane, Winthrop Murray (1853-1920), a United States senator, born at Dalton, Mass., and educated at Wiliston Seminary, Easthampton, Mass. He is connected with the Crane manufacturing concern at Dalton. Mr. Crane was a delegate-at-large to the Republican conventions of 1892, 1896, 1904 and 1908. In 1908 he was made a member of the Republican National Committee. He was lieutenant-general of Massachusetts from 1897 to 1899, gov-

ernor from 1900 to 1902, and was made United States senator in 1905, and again in 1907 for the term expiring in 1913. He was influential in the drafting of the platform which was adopted by the Republican convention at Chicago in 1908; and was one of the leaders of the old-line faction of the party in 1912. At the expiration of his term he voluntarily retired to private life.

Crane Fly, a family of mosquitolike insects of the order Diptera. The representatives found in the United States are seen in great numbers flying slowly over fields in a misty mass. They have long, slender bodies, narrow wings, threadlike antennæ and long, but exceedingly weak, legs. The larvæ hatch in the ground and do great damage to grass and grain by gnawing the tender stalks just beneath the ground. Crane flies, in the adult stage, are harmless but annoying, and are easily destroyed because they can neither fly nor crawl rapidly.

Cra'nial Nerves, the 12 pairs of nerves which originate at the base of the brain and are distributed to the head and face and the upper part of the thorax. They are connected with several important functions. The first pair are the nerves of smell, the second, the optic nerves. The third are distributed to the muscles which control the eyeball and that which lifts the upper eyelid, and the fourth pair also assist in the control of the eyeball. The fifth pair have two roots and three branches. The smallest of these branches is distributed over the muscles and skin of the forehead and upper eyelid, and in the mucous membranes of the nose; another division goes to the skin over the temple, to the cheek between the eyebrow and mouth and to the upper teeth, to the pharynx and soft palate, nose lining and roof of the mouth. The largest branch is distributed over the side of the head and the external ear, the lower part of the face; mucous membrane of the mouth, the tip of the tongue, lower teeth, salivary glands and to the muscles of mastication in the lower jaw.

The nerves of the sixth pair connect

with one of the muscles of the eyeball, and those of the seventh pair are distributed over parts of the face and scalp. The eighth pair are auditory, and connect with the internal ear. The ninth pair are distributed to the middle ear, the pharynx and the back part of the tongue. The nerves of the tenth pair are both motor and sensory and their function is chiefly motor. They are the longest of the cranial nerves, extending to the pharynx, gullet and stomach, the larynx and windpipe, heart and lungs. The 11th pair arise from several roots attached to the spinal cord; they control some of the respiratory movements and the muscles by which swallowing is accomplished. The 12th pair connect with the hyoid bone and with the muscles of the tongue, and aid in speech.

Cranmer, Thomas (1489-1556), Archbishop of Canterbury, born at Aslacton, England. He studied at Jesus College, Cambridge, and continued as lecturer there for 26 years. Having expressed himself to the effect that King Henry VIII could secure a divorce from Catharine by an appeal to the universities, he was made Archbishop of Canterbury in 1533, and proved to be a compliant servant of his sovereign. He divorced the King from Catharine, married him to Anne Boleyn and secured Henry's divorce from Anne and from her successor, Anne of Cleves, all at that tyrant's command. Cranmer desired to help the common people obtain a knowledge of the Bible, and to this end encouraged the circulation of the Scriptures in the translation called by his name. He suffered martyrdom because of his religious beliefs.

Cranston, R. I., a city of Providence Co., 4 m. s.w. of Providence, on the New York, New Haven & Hartford Railroad. It is an attractive residential center for many business men of Providence. The town of Cranston contains a number of villages which are among the most prosperous in the state. Market gardening is an important industry. There are breweries and extensive manufacturing of cotton goods and wire. The

town has four libraries. A state prison, state reform schools for boys and girls, an insane asylum and an almshouse are located here. Cranston was originally a part of Providence but in 1754 it was incorporated as a separate town. Population in 1920, 29,407.

Crape, or **Crêpe**, a thin, crinkled fabric made of raw silk. The silk is tightly twisted and woven into a thin gauze without removing the gummy matter left by the worm. It is then dressed with a solution of gum, which causes the threads to untwist, thus producing a wrinkled appearance. Crape is manufactured in both black and colors. Black crape is worn as a sign of mourning in many countries, the custom having originated in Bologna, Italy. China crape, or *crêpe de chine*, is a widely-used fabric. Imitation crapes are sometimes made of cotton and wool, the rough and wrinkled surface being imparted by passing them through heavy rollers.

Cras'sus, Marcus Licinius (about 114-53 B. C.), a Roman triumvir, sur-named *Dives* (the rich). To escape surveillance he went to Spain in 85 B. C.; two years later, with Sulla, distinguished himself in the civil war; as prætor, crushed the Servile revolt of 71 B. C.; and the following year became consul with Pompey, whom he hated. Cæsar valued Crassus, and about 60 B. C., with Crassus and Pompey, formed the First Triumvirate. In 55 B. C., again consul, Crassus gained the Province of Syria, and soon marched against the Parthians, by whom he was defeated and slain through treachery.

Crawfish". See CRAYFISH.

Crawford, Francis Marion (1854-1909), an American novelist, born at Bagni di Lucca, Italy. His father was Thomas Crawford, the sculptor. He studied in America, England and Germany, went to India in 1879 and became the editor of the Allahabad *Indian Herald*. After living in America from 1881 to 1883 he removed to Sorrento, where he remained the greater part of his life. He wrote historical and descriptive works, including *Constantinople*, *Ave*

Roma Immortalis, and *Rulers of the South*. His fiction, especially the *Sarcinesca* series, stories of modern Rome, represents his best work. It includes *Mr. Isaacs*, *Zoroaster*, *Via Crucis*, *In the Palace of the King*, *Marietta*, *a Maid of Venice*, *Katharine Lauderdale* and *Salve Venetia*.

Crawford, William Harris (1772-1834), an American statesman, born in Amherst County, Va. He removed to Georgia with his father's family, taught school and studied law, beginning his practice at Lexington in 1798. He was one of the compilers of the first digest of Georgia laws. In 1802 he became a member of the State Senate and was chosen United States senator in 1807. He was appointed minister to France in 1813, secretary of war in 1815 and secretary of the treasury in 1816, holding the last position until 1825. In the presidential contest of 1824 Crawford was a prominent candidate, but a stroke of paralysis about this time rendered his election impossible. He served as circuit judge with great efficiency from 1827 until near the end of his life. He was opposed to the Federal policy of internal improvements and to the nullification movement. Personally he was a man of conspicuous social gifts and religious convictions.

Crawfordsville, Ind., a city and county seat of Montgomery Co., 43 m. n.w. of Indianapolis and 28 m. s. of Lafayette, on Sugar Creek and on the Cleveland, Cincinnati, Chicago & St. Louis and the Vandalia and Monon Route railroads. It is the trade center for an important agricultural region, and has foundries and machine shops, and manufactories of nails, furniture, printed matter, undertaking supplies, paving brick, matches, wire fencing and carriages. It is the seat of Wabash College (Presbyterian), founded in 1832, and of St. Charles Academy. Crawfordsville was settled in 1822 and incorporated in 1865. Population in 1920, U. S. Census, 10,139.

Cray'fish", or Crawfish, a family of Crustaceans whose members are, in

form, much like the lobster but of much more brilliant color. They may be found in holes in the banks of rapidly flowing streams or near the shores of clear lakes in temperate zones. There is none in the tropics. Like the lobsters, crayfishes bear a horny covering, which is not of living tissue and hence does not grow. As the animal becomes larger, it must shed this coat, which has become too small to be a protection; the removal of this is accomplished by numerous contortions which involve the breaking loose of the connecting tissues. For several days after its removal, the crayfish is in a peculiarly helpless and unprotected state, but soon a new coat is formed. During the first year this process, called ecdysis, takes place three or four times; in succeeding years the operation is less frequent, and as the crayfish reaches maturity seldom occurs. Crayfish have the power of regeneration of lost parts to such an extent that if an eye or a claw be removed a new member is soon grown in its place. Crayfish are edible and are considered an excellent food in many parts of Europe and America.

Cray'on, a pencil made of pipe clay, chalk or charcoal and used for drawing purposes. For blackboard use in schools crayons are of chalk. Black crayons used in drawing are colored with lamp-black; the crayons used in pastels and other colored drawings contain vegetable coloring matter like saffron. Artistic drawings, principally of faces and the human figure, are made with charcoal crayons. See CHARCOAL; CHALK.

Cream'ery, a factory for making butter. It is generally located in the center of a dairy-farming section, and the cream or both the cream and milk are bought. The factory consists of a milk tester for testing the fat content of the milk and cream; a separator, which separates the milk from the cream by centrifugal force; tanks for holding the fresh milk, cream and skim milk; churns; and storage cellars for the butter. The cream separators and churns are operated by electricity or by gasoline en-

gines, and the butter is sometimes worked by the same power. The factory may be owned by an individual, by a corporation or by an association of farmers who build and operate a common creamery rather than do the work on separate farms. If operated by individuals or a company, the milk is bought from the farms. The skim milk that results is returned to the farmers or resold.

The butter is packed in crocks or put up in one- or two-pound packages, for the market. The ordinary creamery has a capacity of five or six tons of butter per day and the largest run up to 15 tons per day. Because of the size of these creameries and the distances from which milk must be hauled daily, skimming stations frequently are located in the district and there the separators are placed. By this means only the cream is transported to the factory and thus the expense of hauling is lessened. Creameries are wholly American institutions and were first operated in 1864, in the State of New York. See MILK TESTER; CREAM SEPARATOR.

Cream of Tartar, a chemical compound known as bitartrate of potassium and obtained from various food products, but more often from wine casks. Crude tartar or argol, as a crystalline deposit, collects on the bottoms and sides of wine casks during the fermentation of the wine, especially when it is made from grapes. This is dissolved in hot water and the coloring matter removed, when the cream of tartar crystallizes. It is soluble in water and forms a part of baking powders. It is also employed for various uses in the arts and in medicine. See BAKING POWDER.

Cream Sep'ara'tor, a machine for separating the cream from milk. When fresh milk is allowed to stand, the cream, which is lighter than the milk, rises to the surface and may be skimmed off; this process thus carried on by the force of gravity may be done more rapidly by centrifugal force, a force made use of in the separator. In the ordinary separator the fresh milk is put into a receiving can, whence it flows into the re-

volving bowl, which may be hollow or divided into compartments by means of conical disks. There the heavier milk is thrown to the edge of the bowl and is drawn off, while the cream occupies the center and is similarly collected. The separator may be operated by hand or by a gasoline engine. In the small dairy farms a hand separator is ordinarily used; power machines are used in creameries and skimming stations. The largest power machines will separate about 2500 quarts of milk per hour.

Many new devices are being constantly added to separators to increase their efficiency and to minimize the labor necessary to operate them; the principle upon which they work is, however, the same for all machines. A cream separator is sometimes called a centrifuge. See MILK TESTER.

Crécy, Kra" sé', Battle of, one of the famous battles of history, fought at Crécy, a town of northern France, Aug. 26, 1346. Edward III, the English leader, with 30,000 soldiers, defeated 100,000 French soldiers under the Count of Alençon. The battle proved that trained footmen properly armed were more than a match for feudal nobles, protected though they were by heavy armor.

Cred'it (from Latin *credere*, to trust), a term used in commerce to denote trust, given or received, for future payment; or, the mercantile reputation entitling one to be trusted. The credit system presupposes general confidence in people's ability to meet their obligations; which, in turn, may be based either upon the honor and ability of the debtor, or upon security deposited as collateral, or both. Examples of the former are the sales of retail merchants on open book accounts; of the latter, checks, bills of exchange, notes, mortgages and bonds (See NEGOTIABLE PAPER). The credit system enables a comparatively small amount of money to suffice for a large number of transactions. It is necessary, however, that money shall be immediately available upon demand.

The development of the credit sys-

tem is of comparatively recent date, but it is now the means by which the vast majority of commercial transactions are conducted. This fact makes the modern banking business of great importance in the community. The bank collects scattered and often idle wealth and makes it the basis of credit (See MONEY, sub-head *Credit Money*). The credit of a bank is the confidence which men have in its solvency. By public credit is meant confidence in the ability and disposition of a nation to fulfill its obligations. Sometimes a period is granted during which a debtor may delay meeting his obligations. This is called a moratorium.

Credit, Letter of. This is usually a circular letter, addressed by a bank to a list of its correspondents in various foreign countries. The purchaser of such a letter writes his usual signature upon it, in the presence of his banker. Upon verification of his signature he may then draw, in one or in many portions, the total amount specified in the letter, securing English money at a bank in England, or German money if in Germany, etc., as circumstances may require. When drawing for the last time, he surrenders the letter of credit which is returned to that bank from which it was purchased. The transaction is completed when each bank has drawn upon the first for what it advanced. This it must do within the time specified in the letter itself.

Crédit Mobilier, *Kra de' Mo" be" lya'*, a large company sanctioned by the French Government in 1852 under the name *Société Générale du Crédit Mobilier*, whose object was to assist all kinds of industrial enterprise through loans upon their personal or movable property. In 1855, however, the directors proposed such a large bond issue that financiers feared the result and such issues were forbidden by the government.

CRÉDIT MOBILIER OF AMERICA was the title adopted by a corporation organized in Pennsylvania in 1863, known as the Pennsylvania Fiscal Agency. In 1867 the charter was purchased by a company organized for the completion

of the Union Pacific Railroad. From the manipulations of those in control, a great public scandal arose which involved eminent members of Congress. It was claimed that in order to secure favors from both houses blocks of Union Pacific Railroad stock were either given to senators and representatives or sold to them at nominal prices. So much publicity was given to the charges that a committee was finally appointed by each house to investigate the matter. As a result two members were named for expulsion from the House of Representatives, but there was not a majority in favor of the recommendation of the committee when a decisive vote was taken.

Cree, a once powerful tribe of the Algonquian race of Indians. Their home was chiefly in Canada in the region of Manitoba and the North West Territories, although they entered the United States at the north. They are closely related to the Ojibways. About 10,000 Crees yet remain upon the Canadian reservations.

Creed, the statement of the doctrines of a church. The four great Catholic creeds are the Apostles', the Nicene, the Chalcedonian and the Athanasian. The text of the Apostles' Creed, which is supposed to have originated with the disciples themselves, dates from about 500 A. D., but may be traced to a much earlier form. The Nicene Creed was adopted by the Council of Nice in 325, having its origin in the dispute concerning the dignity and character of Christ, which dispute began as early as the second century. This creed expresses the belief that Christ is the same substance as the Father. The Chalcedonian Creed was pronounced by the Chalcedonian Council in 451, and expresses in definite terms the belief in the divinity and humanity of our Lord, these two natures being comprised in the unity of one person. The Athanasian Creed, dating from the sixth century, expresses the doctrine of the Trinity as upheld by St. Athanasius. The decrees of the Council of Trent (1545-63) contained a more detailed statement of Catholic doctrine than

had been set forth in any of the creeds. These decrees, with the additions of 1854 and 1870, are the authoritative confession of faith of the Roman Church. The most notable confessions of faith of the Protestant churches are the Lutheran, the Reformed, the Anglican, or Thirty-nine Articles of the Church of England, and the Puritan, or Westminster Confession of Faith. See APOSTLES' CREED; NICENE CREED; ARTICLES, THE THIRTY-NINE.

Creek Indians, a confederacy of Indian tribes originally including the Seminoles, Muskogees, Alabamas, Natchez and others. They lived in Georgia and Alabama, were agricultural and built permanent log houses. Their massacres of the Americans were frequent, but in 1814 they met total defeat and finally ceded their lands to the government. They suffered heavy losses in the Civil War. About 16,000 live in Oklahoma. See FIVE CIVILIZED TRIBES.

Creel'man, James (1859-1915), a newspaper correspondent and editor, born in Montreal, Canada. He left home at the age of 12 and soon was employed in New York in the office of *Church and State*. Later he learned the printing business, studied theology under Dr. Talmage and in 1876 became a reporter for the *New York Herald*, subsequently being its correspondent and editorial writer. He edited the London edition in 1890 and the Paris edition in 1891-1892, was successively editor of the *New York Evening Telegram*, British editor of the *Cosmopolitan Magazine* and war correspondent for New York papers during the Japanese War, the Græco-Turkish War, the Cuban War and the Philippine War. Later still he was connected with the *New York Journal* and the *New York World*, and from 1906 to 1910 was associate editor of *Pearson's Magazine*. At various times Creelman interviewed Leo XIII, King George of Greece, the Emperor of Korea, President Faure, Bismarck, H. M. Stanley, Kossuth and Tolstoy. His writings include *On the Great Highway*, *Eagle Blood* and *Why We Love Lincoln*.

Creeper Family, a family of small,

slender-billed birds, which resemble the nuthatches in their tree-climbing habits, differing in their method, which is only to ascend and never to descend the tree trunks. The creeper is usually a somewhat solitary bird, though sometimes seen in company with nuthatches, titmice and kinglets. Like these birds, the creeper is a diligent destroyer of insect eggs and larvæ.

BROWN CREEPER. This is smaller than the English sparrow and may be known by its brown body, which is more or less striped with grayish-white, its whitish under parts and its slender, curved bill. It is a common bird in southern Canada and the northern part of the Eastern and Middle states in summer, migrating in the fall to the eastern part of the country south of the 41st parallel. The nest is placed behind a loose piece of bark and is composed of moss, feathers, fine twigs, spiders, cocoons, etc. Five to eight spotted eggs are laid.

Crema'tion, the burning of the bodies of the dead. It was a general practice of the ancient world, except in China, Egypt and Judæa. The Christians, believing in the resurrection of the body, objected to this method and stopped the practice. It has been revived in modern times on hygienic grounds and because of overcrowding in cemeteries, but popular sentiment still views the practice with disfavor. See BURIAL.

Cre'osote, a colorless, oily liquid having a sweetish, burning taste and a strong, disagreeable odor. It is used principally for its preserving properties. It was discovered in 1832 by a German chemist named Reichenbach, in subjecting beechwood tar to distillation. It is slightly heavier than water, readily dissolves in alcohol, chloroform and ether and burns with a smoky flame. It forms the basis of a number of remedies in medicine, dentistry and surgery on account of its antiseptic qualities. Its largest use is in the preservation of timber from dry rot and other diseases, and it is especially valuable in preserving railway crossties in tropical countries. It is the only practical remedy against the

teredo, the worm that destroys wooden piles when placed in salt water. Paving blocks are immersed in creosote as a preservative. Creosote is purchased from the chemists, principally in Germany in the form of oil of creosote. See COAL TAR; CARBOLIC ACID.

Cress, a name applied to many species of the Mustard Family, all characterized by having a thin, watery juice with a sharp, biting taste. Many of them are aquatic plants, and these generally have long, slender stems and round-lobed leaves, which, though frequently hairy, are bright green and smooth in appearance. The flowers are small and white and may be found from April until September. Our commonest water cress is a native of England and was brought here for use in salads and medicines. It is frequently found in cool brooks or clear springs, where it grows in thick patches. The flowers, like those of all the mustards, are in four parts, the petals being arranged in the form of the Greek cross. "The stamens are six in number, the two outer being shorter than the two inner. Rock cress, yellow rocket, or winter cress, spring cress and bitter cress are meadow or marsh plants, the first two having tiny yellow flowers but otherwise differing only slightly from the common cress.

Crete, or **Can'dia**, an island in the Mediterranean, a possession of Greece, lying directly south of that country. Its length is 150 m., its width varies from 6 to 35 m. and its area is 3326 sq. m. The mountains, principally the White, or Madras, were formerly covered with dense forests. Mt. Ida has an altitude of about 8000 ft. The principal products are lemons, oranges, grapes, olive oil and chestnuts. The commerce with Greece and Turkey is large. Canea, Candia and Retimo are the principal ports; Canea is the capital. Population in 1900, 309,543.

Crib'bage, a card game that may be played by two, three or four persons, but is considered most scientific when played by two. The entire deck is used, and a game consists of 61 points, which are

made by means of fifteens, sequences, flushes, etc. There are neither trumps nor tricks. The face cards and tens count ten each, while the values of the other cards vary with their rank, the ace counting one, etc. The whole pack is shuffled and cut, after which five or six cards are dealt to each player, and the remaining cards are left upon the table face down. After inspecting his cards each player throws down two cards, face down, the choice of which is guided by the cards remaining in his hands. The dealer's opponent then cuts the pack again, and the top card is turned up; this with the four cards thrown down upon the table constitute "the crib," the value of which is added to the dealer's score at the close of the hand. This turned card also counts as a part of the cards of each person's hand. The play begins with the dealer's adversary placing a card upon the table and giving its value; the dealer then follows, also calling the value of the card he plays. When the hand is completed, each player counts all the fifteens he can make by combinations of the cards he holds, including the turned-up card. The dealer then counts the crib in the same way and adds it to his score. A sequence is three or more successive cards, not necessarily of a suit, and a flush is a crib of one suit. Other counts are "pairs," "pairs royal," "double pairs," "double pairs royal," etc. The tally is generally kept upon a perforated board, where the count is indicated by means of pegs inserted at the proper points. For details and rules, consult Spalding's *Home Library*, No. 20.

Crick'et, a family of familiar insects of the order Orthoptera, generally more familiar to the ear than to the eye. This voiceless chorus, which is so commonly heard that it is chiefly noticed when it ceases, is made by the male cricket as he rubs the bases of the forewings together. This method of attracting attention to himself is called stridulation, and the roughened portions of the wings are called the stridulating apparatus. The cricket is supposed to be thus calling to his mate. The most familiar crickets

are those of the house and field; they are dark in color and are not often seen during the day. The tree crickets are green, and the mole crickets are practically eyeless creatures with shovel-like feet, with which they dig their tunnels in the ground.

The majority of the crickets are omnivorous. Those that live in the house, as the gentle "cricket on the hearth," are ready to devour any food product at hand, and, failing in finding a sufficient supply, do not hesitate to devour each other. They are particularly fond of sweet liquids and are easiest exterminated by exposing vessels of these lures in such a way that the cricket's greed may cause its death.

Crickets can be distinguished from the grasshoppers, locusts or katydids only by minute examination. Like the grasshoppers, they have long antennæ, but the last segments of their legs are three-rather than four-jointed. The number of simple eyes of the cricket is variable, while the grasshopper is without any. The life of the cricket lasts through but one summer; the eggs deposited in the ground in the autumn hatch the following spring. Thus the old tale of the cricket begging from the ant for a winter's supply of food, though excellent of moral, is not wholly true to life.

Cricket, the national game of England. It is played with balls, bats and wickets on a smooth green, preferably of six or more acres, by two teams, usually of 11 each; a game consists of two *innings* for each team. A cricket ball is three inches in diameter, and its weight five and one-half ounces. The bat must not exceed 38 inches in length, nor four and one-quarter inches in width. There are two *wickets*, one near the center of the field and another facing it at a distance of 22 yards. Each consists of three upright stakes one and one-half inches in diameter and set in a straight line eight inches long. These project 27 inches above the turf and support two light pieces of wood called *bails*.

An umpire is chosen by each team; boundaries are then agreed upon and in-

nings settled by the captains, usually upon the toss of a coin. One captain then stations two batters facing each other, one to protect the center wicket and one at the side of the other wicket. The remaining nine men of this team come to bat in turn, and when ten have been put out the first inning for this team is over. The captain of the other team stations a *wicket keeper* behind the center wicket and the other men about the field as desired. The *bowler* rolls four balls in succession, but sometimes five or six, if so agreed, at the center wicket, endeavoring to make the ball hit the wicket perhaps on the first bound. It is the purpose of the batter to prevent his hitting the wicket and knocking off the bails. The batter is put out if he fails to protect the wicket; if he himself accidentally knocks it down; if he stops a good ball with any part of his person; if he steps out of and does not return to his proper position before the ball is thrown against his wicket; if he willfully obstructs any of the fielders; or if he knocks a fly which is caught by any one of the opposing team.

Whenever the batter hits the ball, and whenever a ball which fails to hit the wicket passes the wicket keeper, the batsmen may exchange positions, if they believe there will be time to do so before either of their wickets can be thrown down. Each such exchange counts one *run* for their team. They sometimes make several runs in succession before the danger becomes too great. When a bowler has rolled four (or six) balls, an *over* is called by the umpire; the fielders then change their positions, and another player bowls an *over* (of four or six balls) from the center wicket.

Cricket has won a place for itself among the sports of America, and cricket clubs, leagues and associations are found in many parts of the country. Naturally it has also been carried to all the British colonies. The rules accepted by all the world are those of the Marylebone Cricket Club of London.

Crimean, Kri me' an, War, a war occurring from 1853 to 1856, in which Rus-

sia was opposed by England, France and Turkey. Russia claimed a protectorate over the Christians in Turkey, and in 1853 she urged terms that would take away Turkey's position as an independent country. Great Britain and France joined forces against Russia in aid of Turkey in 1854, and a year later Sardinia came in as an ally. The chief engagements of the war were fought about the Black Sea, and it closed with the taking of Sebastopol in 1855 (See SEBASTOPOL, SIEGE OF). Peace was signed at Paris, March, 1856, whereby Russia gave up all her claims. The sufferings of the soldiers were terrible during this struggle, and it was at this time that Florence Nightingale gave her own services as nurse and organized proper nursing in war hospitals. See NIGHTINGALE, FLORENCE.

Cri'noids, a group of sea animals with lily-shaped body, consisting of a small cup, numerous flexible arms and a long, jointed stem, which the animal attaches to the bed of the sea, where it remains during practically its entire life. The species existed in large numbers during the Carboniferous Age, but is now rare. See FOSSILS.

Crinoline, *Krin' o lin*, a name first employed by French dressmakers to designate a stiff, wiry fabric made of horsehair, used for distending dress skirts. By extension it was also applied to hoops of steel and wire, used later for the same purpose. In the time of Queen Elizabeth, in the early years of the 18th century and again in the middle of the 19th century, this fashion for a time held sway. At the present day the name crinoline is applied to a cotton gauze stiffened with glue, used by dressmakers for stiffening parts of garments and by milliners.

Crip'ple Creek, Colo., a city and the county seat of Teller Co., about 40 m. s.w. of Colorado Springs, almost in the geographical center of the state. Transportation is furnished by the Colorado Springs & Cripple Creek District (a branch of the Colorado & Southern), the Mid-

land Terminal (which connects with the Colorado Midland) and other railroads. Cripple Creek is situated at an elevation of 9600 ft. at the head of the stream from which it derives its name. Water for supplying the city comes from Pike's Peak ten miles distant. Cripple Creek is one of the most famous mining camps in the United States. Some gold was found here in the "sixties," but the source of the metal was not discovered until 1891. In that year the output was valued at \$949; and in the first 15 years following the opening of the veins, ore to the value of more than \$200,000,000 was taken out. The first railway reached the town in 1894, in which year occurred one of the most famous strikes in the history of American industry. In 1896 the city was nearly destroyed by fire; and in 1903-1904 a second strike, even greater than the first, took place. An interesting feature of the mining here is the peculiar character of the ores, which have necessitated entirely new methods in mining and machinery. The mining district covers an area about eight or ten miles in length, which is traversed by a network of tunnels through granite rock. Although there are several smelters and cyanide extractors in the town, the greater part of the ore is shipped elsewhere for treatment. Numerous small mining towns and villages are located near Cripple Creek, one of the most important of which is Victor. Population in 1920, U. S. Census, 2,325.

Crisp, Charles Frederic (1845-1896), an American statesman, born in Sheffield, England. His parents, who had been visiting in England, returned to the United States the year after his birth and settled in Georgia. He served as lieutenant in the Confederate army and after the war studied law. From 1872 until 1877 he was attorney-general of the Southern Judicial District of Georgia, after which he became judge of the Superior Court of the state. He was a member of Congress from 1882 until his death, and the last four years was speaker of the House.

Crispi, Kre' spe, Francesco (1819-1901), an Italian statesman prominent in the movement for Italian liberation. In 1848 he was actively engaged in the unsuccessful Sicilian uprising, and in 1860 assisted Garibaldi in his expedition for the liberation of the two Sicilies. Later he became an active member of the Italian Parliament. In 1887 he became head of the cabinet and minister of foreign affairs, in this capacity zealously promoting the Triple Alliance between Germany, Italy and Austria.

Crit'tenden, John Jordan (1787-1863), an American statesman, born in Kentucky. He graduated at William and Mary College in 1807, studied law and entered upon a varied political career. He was appointed attorney-general of the Territory of Illinois, served for a time in the War of 1812, was chosen to the State Legislature in 1816 and to the United States Senate the following year. He again was elected to the Senate in 1835. In 1842 he became attorney-general in Harrison's cabinet, but on the death of Harrison he resigned, and was appointed to fill the seat in the Senate left vacant by Clay, being elected at the expiration of that term to the full term following. Subsequently he was governor of Kentucky, attorney-general under Fillmore, and congressman from 1855 until his death.

Croa'tia and Slavo'nia. In the great Slavic invasion of the Balkan peninsula in the seventh century of our era the most western group were the Wends or the Slovens, who settled in territory that subsequently became the southern provinces of Austria,—the southern part of Carinthia and Styria. To the south of them, along the Save river, were Croats whose territory joined that of the Serbs to the south and east while the Slavonians settled to the east of the Croats in the section of country south of the Drave river.

There was no difference in ethnology or language between these various people; but the Croats expanded to the west and adopted the culture of the early Roman settlers in that section, which gave

them the Catholic faith and the Roman alphabet, in these respects they differed from the Serbs to the south who adopted the culture of Constantinople and the Cyrillic alphabet. Then they experienced different political fortunes. The Slovenes became a part of Austria in the eighth century; the Serbs passed under Turkish rule after the battle of Kossovo in 1387.

Croatia was attached to Hungary in 1102 and passed with that country under the control of Austria in 1527 when Austria, Hungary, and Bohemia united as autonomous states. From that time until 1918 Croatia-Slavonia was under the rule of Austria-Hungary, more especially Hungary since 1867. During all these centuries the consciousness of racial unity with other south Slavic people was not lost and when their chance came at the conclusion of the World War Croatia-Slavonia became a part of Jugo-Slavia.

The province of Croatia while broken and hilly in most parts is a beautiful section. The Karst region, or highlands of Slavonia, are celebrated in this respect. The river valleys are fertile. The inhabitants possess the racial characteristics of the Slavic people in general. There is not a great deal of manufacturing but the country is rich in mineral and forest wealth, and water power is abundant. With their longing for independence and political union with the south Slavs realized, a period of national development seems assured. (See JUGO-SLAVIA.)

Crocodile, Krok' o dile, a name given to a family of Reptiles, which includes the alligators, gavials and true crocodiles. It is the highest class of Reptiles, being placed above the lizards. Crocodiles have long bodies covered by a horny skin which, especially upon the back, forms a tough, protective armor. The head of the crocodile is flat and has a long, protruding jaw, armed with strong teeth. These and a powerful tail are its only weapons of defense and are rarely used except to resent an attack. The limbs of the crocodile are well developed, but it is as much a water animal as a land animal.

Cro'cus, a low plant of the Iris Family. The flower, which in the spring-flowering species appears before the leaves, is almost stemless, rising directly from a bulb. The spring crocus is the best-known species on account of the varied colors of the flowers and of their early appearance. It is common in door-yards, where it appears year after year after having once been set. The fall species has the same partially tubular flower, which is generally purple or white, rarely yellow.

Crœsus, Kre'sus, the last King of Lydia. He reigned from 560 to 546 B. C. He gained control of the Ionian cities after he succeeded to his kingdom, becoming so wealthy that the expression "rich as Crœsus" is used today to denote fabulous riches. He sought alliance with the Greeks to secure the help of their fleets. He joined Nabonidus of Babylonia to put down the rising power of Cyrus. Cyrus and Crœsus met at the borders of the Kingdom of Lydia, where Crœsus was defeated. Cyrus followed him to his capital, Sardis, and took the city by storm. Various legends are related by the Greeks concerning him.

Croix de Guerre, *krawh de gare*, the French for "cross of war," is the name of a French military decoration instituted by law of April 8, 1915. The Croix de

Guerre is made of Florentine bronze. It consists of four branches, among which are two crossed swords. On the reverse side the center represents a head of the republic bearing a Phrygian bonnet, ornamented by a laurel crown on which is engraved "French Republic." On the other side is the inscription "1914-1915, 1914-1916," etc. The cross is worn on the left side of the breast immediately after the Legion of Honor or the Military Medal, and is fastened to a green ribbon having a red edge on each border and five red bands parallel with the edges.

This decoration was instituted to commemorate, from the beginning of the World War, special acts of bravery. It was conferred on military men of the armies on land or sea, whether French or foreigners, who obtained certain citations for bravery during the war against Germany. Civilians and members of the different military personnels also received the cross if they obtained one of the citations.

Crompton, Samuel (1753-1827), an English inventor, born in Lancashire. His principal invention is the mule-jenny, a machine for spinning cotton, the mechanism of which is still applied to some 30,000,000 spindles now in common use. Throughout his life he struggled against poverty and hardship, the only official recognition he ever received being a grant of £5000 from the house of Commons.

Crom'well, Oliver (1599-1658), lord protector of England, born in Huntingdon. His father was Robert Cromwell, the younger son of Sir Henry Cromwell, knighted by Queen Elizabeth. Oliver entered Cambridge in 1616, but left on the death of his father the following year to manage his small estate at Huntingdon. In 1620 he married the daughter of Sir James Bourchier; in 1628 he entered Parliament as representative from Huntingdon. During the next few years the contest between Charles I and Parliament became so acute as to menace civil and religious liberty, and Cromwell, Hamp-



CROCUS

den, Pym and others at one time seriously planned emigrating to America. In 1640 Cromwell was a member of the "Short Parliament," summoned by the King in the vain hope of securing a subsidy to carry on the war with Scotland. Six months after he had prorogued this body the King was compelled by the condition of his treasury to reassemble it. In this Parliament, known as the "Long Parliament," ending in 1653, Cromwell early attracted attention by the vehemence of his oratory in attacking the arbitrary rule of the King and the abuses in the Church.

THE FIRST CIVIL WAR. When the Civil War broke out in 1642 between the King's followers, called "Cavaliers," and the adherents of Parliament, nicknamed "Roundheads," Cromwell, appointed captain and later colonel, raised a company of horse composed of zealous Puritans. He and his troop distinguished themselves at Cambridge, Gainsborough and Winceby, and in 1644 decided the Battle of Marston Moor in favor of the Parliamentary forces, gaining here the designation "Ironsides," by which they were thereafter known. In 1645 Cromwell was made lieutenant-general under Sir Thomas Fairfax, commander-in-chief, and introduced into the whole army the discipline and spirit of his "Ironsides." On June 14 of the same year he routed the King's army at the decisive Battle of Naseby. He was prominent in the succeeding series of minor engagements that finally crushed the King's forces; and was present with Fairfax at the capitulation of Oxford, June 24, 1646, which closed the first part of the Civil War. He then removed with his family from Ely to London.

THE SECOND CIVIL WAR. The next two years were occupied with disputes between Parliament and the army over the question of the establishment of Presbyterianism or of Independency and religious toleration, and with negotiations concerning the restoration of the King. Cromwell favored Independency, but opposed the sectarian excesses of the army, and was more and more forced to the

front by circumstances as the only man who could prevent anarchy. He seems still to have hoped for the restoration of the King, under guarantees of liberty, but this hope was dispelled by the escape of Charles from the custody of the army; and in March, 1648, civil war again broke out.

After suppressing the Royalists in Wales, Cromwell defeated the Scotch army of the King at Preston (Aug. 17, 1648), and occupied Edinburgh. He then marched to London, and Colonel Pride "purged" Parliament of the Presbyterians, who had been negotiating with the King. The remnant, called "Rump Parliament," brought the King to trial, and he was executed Jan. 30, 1649. The following May the Commonwealth was proclaimed.

THE COMMONWEALTH. The monarchy being destroyed in England, Cromwell next reduced Ireland to submission in a six months' campaign of great harshness; and, now commander-in-chief of all the forces of the Commonwealth, turned to the subjugation of Scotland and Prince Charles (afterwards Charles II), which he accomplished in the battles of Dunbar (Sept. 3, 1650) and Worcester (Sept. 3, 1651). This terminated the Civil War and established the Commonwealth in the three kingdoms.

Cromwell entered London in triumph Sept. 12, 1651, the idol of the army and in a position to become dictator. But he had no such desire. Supreme authority had been forced upon him by circumstances, and as has been well said, "Henceforth his life was a vain attempt to clothe that force in constitutional forms." For a year and a half he tried to work by means of the Rump Parliament; but when it became evident that this body intended to perpetuate itself without a representative election, Cromwell, backed by the army, terminated its existence Apr. 20, 1653. The "Little" or "Barebones" Parliament met in July of the same year, but accomplished nothing and returned its powers to Cromwell. It had, however, named a Council of State, which now drew up a constitution, known

as the *Instrument of Government*. This was ratified by the Council of Officers of the army, and created Cromwell protector. It also provided for the election of a representative Parliament which met in September, 1654.

Cromwell meanwhile had been governing in a masterly way at home and abroad, and soon arbitrarily dissolved the new Parliament, impatient with its fruitless discussions; and divided the country into 12 military districts with a major-general over each. Another Parliament was summoned in 1656, which voted supplies, adopted a new constitution and urged Cromwell to become king. He declined, but was again inaugurated as protector, this time with great pomp and ceremony. Parliament adjourned, leaving him at the height of his power and with his government apparently established at last on a constitutional basis. When the House of Commons reassembled after six months, however, with the members present who had previously been denied admission, a captious spirit developed, a quarrel arose over the House of Lords, and Cromwell dissolved Parliament in anger. While still ruling with great vigor and efficiency, he died on Sept. 3, 1658, the anniversary of his victories at Dunbar and Worcester.

CHARACTER AND WORK. In estimating Cromwell's character and work, it must be remembered that circumstances forced him into a most difficult position and fixed for him the problem which he must solve. He must conserve what had been gained in saving the country from the arbitrary power of a king; he must also save it from the worse tyranny of an unrepresentative Parliament, combining legislative and executive functions; and he must meanwhile see to it that government was effectively carried on. It was a serious dilemma. He had no desire to exercise arbitrary rule. Nevertheless, he was preeminently a man of action, no philosopher; and if his impatience at inefficiency and abstract debate led him into the exercise of the same arbitrary power in his own person which he was trying to overthrow in the King and in Parliament,

it was because of his passion for getting things done.

Cromwell was one of the great men of England and of the world. He was a great general. Without military training and with no military experience until after he was 40 years old, his natural genius welded and disciplined an invincible army which followed him to hard-won victory with boundless enthusiasm. He was equally great as a statesman. He loved righteousness and justice. He was farsighted and forceful. He chose his officials for their ability alone; set in motion a policy for the union of the three kingdoms; made the courts renowned for justice; encouraged literature and learning (Milton and Marvell were his secretaries); favored religious toleration in an intolerant age; and breathed everywhere into the forms of government the spirit of patriotism. His foreign policy aimed at the establishment of peace and commerce, at the extension of Protestantism by the union of all Protestant states, and at the strengthening and exaltation of the British Empire. Never had the fame of an English ruler stood higher than his; and at his death the position of England was a glorious one among the nations.

Cromwell, Thomas, EARL OF ESSEX (about 1485-1540), an English statesman, born in Putney. Of humble parentage and with limited education he began his work as a clerk, and in 1513 he was employed by Cardinal Wolsey as an agent, in which position he remained until Wolsey's fall and disgrace. Henry VIII made him secretary of state in 1534, and for six years Cromwell, with iron will and relentlessness of purpose, attempted to establish an absolute despotism. The years when he was in power were popularly known as the Reign of Terror. He supported the cause of the Reformation, urging the King to ignore the supremacy of the Pope and declare himself the head of the Church of England. Cromwell was made Earl of Essex in 1540. The same year he fell into disfavor with the King because he had promoted Henry's

marriage with Anne of Cleves, and was tried for treason and executed.

Crookes, Sir William (1832-), an English physicist, born in London. After studying at the Royal College of Chemistry he became superintendent in the Radcliffe Observatory and then professor of chemistry in the Chester Training College. His chemical and electrical discoveries and inventions include the Crookes tube, used in Roentgen ray photography, a process for obtaining a perfect vacuum in incandescent lighting, a process for separating silver and gold from ores, and the radiometer. He was made fellow of the Royal Society in 1863, vice-president of the Chemical Society in 1876 and received the gold medal and 3000 francs from the French Academy of Science in 1880. In 1859 he founded the *Chemical News* and in 1864 became editor of the *Quarterly Journal of Science*. Among other works he has written *Select Methods of Chemical Analysis and Psychic Force and Modern Spiritualism*.

Crooks'ton, Minn., a city and the county seat of Polk Co., about 25 m. s.e. of Grand Forks and about 300 m. n.w. of Minneapolis, in the Red River Valley and on the Red Lake River. Several lines of the Great Northern Railway and a line of the Northern Pacific enter the city. The river is dammed to provide water power for manufacturing, the principal manufactures being lumber, farming tools, wagons, sleighs, leather, flour, and brick. The center of a fertile agricultural region, the city carries on a large trade in grain, potatoes and other farm products. It is also an important market for lumber and live stock. Crookston is the seat of a Federal land office and of a state agricultural high school. It has a Carnegie library and St. Vincent and Bethesda hospitals. Settled about 1872, the town was incorporated in 1879; its city charter was granted in 1883, revised in 1906. The place was named in honor of William Crooks, an early settler. Population in 1920, 6,825.

Croquet, Kro ka', a game played out of doors, by two or more persons, on

well-rolled turf or a smooth clay surface; or, indoors, upon a large, firm table usually with a smooth cloth cover and a raised edge. The game consists in the effort of each player to surpass opponents in driving a single wooden ball through a series of arches, or *wickets*, usually seven in number, touching a stake, returning through five of the arches previously passed and two others, and hitting a second stake. Each plays in turn and may have two strokes in which to get through an arch or hit another's ball. By doing either of these, two more strokes may be earned. After hitting a given ball, the player is *dead* on that ball until he has passed through an arch (or hit the first stake). If but two play, each may use more than one ball. When four, six or eight play, it is common practice for groups of two, three or four to play as partners, assisting each other when possible and opposing the common enemy by knocking their balls out of position and thus delaying their progress. One's ball becomes a *rover* when it has been through all the wickets. It may then be used to play in turn upon every other ball, helping partners and hindering opponents. In driving, wooden mallets are used. These now have longer heads than in the past. Handles may be of any desired length, but the present tendency is to shorten them. Many special rules have been evolved, so that every problem of the game is now properly covered. If possible, the arches for an outdoor game should be properly spaced on a court 45 by 90 ft. in size.

Cros'by, Frances Jane (Fanny) (1820-1915), a noted American hymn writer, born in Putnam County, New York. She became totally blind when six weeks old. In 1839 she entered the New York Institute for the Blind, where she studied for nine years; after which she remained for 11 years longer as teacher of Greek and Roman history and other branches. In 1858 she married Alexander Van Alstyne, a blind music teacher. She early developed a sweet and contented spirit and displayed an unusual

gift for religious poetry. Of her blindness she said, at the age of 93, "But the Good Spirit lit a candle in my soul which gave me a light that many mortals never dreamed of."

She often wrote verses of welcome to noted men who visited the Institute. With many of these men, including several presidents, she formed interesting friendships. Her long lifetime witnessed the life of every president of the United States from Washington to Wilson except that of Washington. She wrote over 6000 hymns, many of which became widely popular, including *Safe in the Arms of Jesus, Pass Me Not O Gentle Saviour, Jesus is Calling, I am Thine O Lord, Jesus Keep me Near the Cross* and *Rescue the Perishing*. Among her songs may be mentioned *There is Music in the Air* and *Hazel Dell*. Her publications include *The Blind Girl, and Other Poems, A Wreath of Columbia's Flowers, Bells of Evening, and Other Poems*.

Cross, a structure whose typical form is that of an upright supporting a straight body laid horizontally across it. In ancient times criminals of the lowest class were frequently executed by being fastened to a cross. Since the crucifixion of Christ, the cross has become a peculiar symbol of reverence for Christians, although it was used as a religious emblem before the Christian Era. In art, the two leading types are the Latin cross (*crux immissa*), thought to be that on which Christ died, and the Greek cross. The former consists of a long upright beam crossed near the top by a transverse beam. The latter, having the four arms of equal length, forms the cross of St. George, which was the national ensign of the English before they united with the Scotch. The early Scotch emblem was the cross of St. Andrew, consisting of two shafts, equal in length, crossed diagonally at the middle. This ensign is now blended with the cross of St. George in the Union Jack. The Maltese cross, having four triangular arms, with their points to the center, was used by the orders of knights.

Crossbill, an American bird of the

Finch Family. The crossbill is about the size of the English sparrow and may be recognized by the general dull red color of the male and the olive and yellow color of the female. The nest is placed in trees of the Pine Family and is a flat structure made of spruce twigs, shreds of bark, etc., and lined with rootlets and horsehair. It contains four brown-spotted eggs. The chief characteristic of the crossbill is the peculiar manner in which the tip of the mandibles cross each other, the function of this odd structure being to enable the bird to secure the seed from the cones of pine and other coniferous trees. The crossbills move about in flocks, stopping wherever food is plentiful. They live in North America, chiefly east of the Great Plains.

Cross'-Fer'tiliza'tion, the process of fertilizing the ovules, or undeveloped seeds, of one flower by means of the pollen, or fertilizing dust, from the flower of a different plant. Loosely, the term is used synonymously with cross-pollination, which refers to the spreading of the pollen from one flower upon the pistil of another, whether or not it results in the production of seeds. The majority of flowers, if self-fertilized, produce weak, imperfect seeds, which develop into feeble plants, and for this reason plants have adopted many curious ways of preventing such a misfortune. The most of these are to be seen in ordinary plants, but are apt to be unnoticed because they are so common. It is the natural tendency of man to consider that the good things of the earth were created chiefly for his own use; whereas many, as the fragrance of the flowers, their brilliant colors and their well-filled honey cups, are, as we shall soon see, for the plant's necessity rather than for our admiration.

There are two common methods by which plants absolutely prevent self-fertilization. One is that adopted by plants which bear staminate, or pollen-producing, flowers upon one individual, and pistillate, or seed-producing, flowers upon another. Examples of such plants are the willow, the hop and the green brier.

Other plants bear flowers whose stamens and pistils mature at different times; thus, in one plant of the high mallow the stamens shed their pollen before the pistil is able to receive it, but somewhere, probably not far away, another high-mallow plant is waiting with ripened pistil surrounded by immature stamens. The common plantain, the figwort and the aristocratic clerodendron are other examples of this same class.

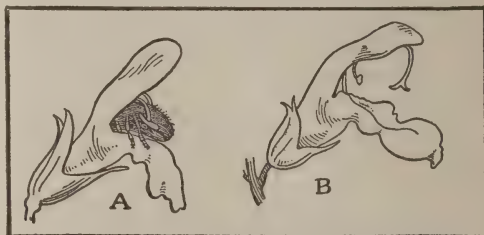
AGENCIES. The majority of flowers, however, bear both stamens and pistils and must provide ways of insuring cross-fertilization; to accomplish this the flowers invite the aid of wind, insects, birds, water and even humankind, all commonly unconscious agents that have been attracted by the freely offered bribes. And these bribes vary so greatly and show such various forms of ingenuity that even the most casual observer can notice them.

Wind. This is one of the chief agencies of cross-fertilization, and yet it is such an uncertain one that wind-fertilized flowers must provide a vast amount of pollen to provide against the wastefulness of its assistant. Pines, a common example of this class, produce so much that the air about the pine groves is golden with the tiny grains, and the ground at blossoming-time is dusted for hundreds of miles with the yellow powder. Aside from being light and dry, these grains are also fitted with tiny wings which serve to keep them afloat in the gentlest breeze. The pistils of wind-fertilized flowers are generally long and seem to reach out for the expected pollen. Their extremities, or stigmas, are often enlarged and covered with a sticky secretion that catches the tiny grains which would slide past a smoother surface.

Since the wind is unaffected by gay colors, fragrance or honey, wind-fertilized flowers are often without petals and sepals or at most are inconspicuous, greenish blossoms not attractive to insects or to man. Corn is another good example of a wind-fertilized plant, though the tassels and the long silk are seldom recognized as blossoms. So light

and so profuse are the pollen grains, however, that species of different kinds must be planted at least 1000 ft. apart to avoid rendering the seed mixed. In countries where westerly winds prevail, the west row of a cornfield always bears notoriously poor ears.

Insects. The greatest varieties of plants depend upon insects for cross-fertilization, and it may be safely said that their flaunting colors and attractive odors are mere advertisements that the bribe of nectar lies within their cups. Insects visit during one day only one kind of flower, and as they go from one to another their hairy bodies carry, almost



FERTILIZATION BY INSECT

without waste, the pollen from one plant to its neighbor. It is to the advantage of the flower, then, to offer the bees, moths, butterflies and other helpers as many facilities as possible for securing both the nectar and the pollen. With great skill most plants spread their pistils and stamens about the opening, but wisely conceal the nectar in deep recesses where it cannot be secured without some delay. The common sage offers a convenient doorstep upon which the bee may alight, and as the body is crowded down into the tube of the blossom the long stigma, hitherto hidden in the concealing upper petal, flies down in such a manner as to brush off any previously gathered pollen; at the same time the stamens at the side leave their contribution for the next plant. The illustration shows the flowers of common sage. A is a young flower visited by a bee; the anthers are pressed close to its abdomen and the stigma is concealed in the lower petal. B is an older flower; the anthers have withered and the stigma has lengthened. The

clover blossom, the milkweed, the dandelion, the toadflax, the violet, the horse-chestnut, in fact almost all of the commonest and best-known flowers, have methods similar or equally effective, and any meadow or woodland will upon a sunny summer day serve as a laboratory for the study of their methods of fertilization. Probably the clover is the most interesting of all, for without the bee the blossoms of the red clover are never fertilized. A newly-produced variety of poppy has an intelligent way of closing two of its petals tightly if a bee lights upon its cup. There the annoyed prisoner buzzes and twists until its big body is covered with pollen, and then the petals slowly open to set it free. Curiously enough these petals never close except upon the entrance of this desirable prisoner.

Many plants, while offering inducements to bees, resent the intrusion of such insects as ants and flies, which sip the nectar but do not carry away upon their smooth bodies enough pollen to "pay for their board." Thus many lilies bear a tangle of hairs in the flower cup, beyond which jungle ants cannot pass; other plants, as the toadflax, or butter-and-eggs, tightly close their lips against the small insects, but open willingly at the touch of the heavy bumblebee. In colors, bees are said to be least attracted to red and most to blue and yellow, and well they know that the fine lines spread upon the petals lead straight to the nectar cups below.

Conspicuous among plants which attract by their odors are the many commonly fragrant flowers, the carrion flower, distasteful to man but evidently pleasing to the insect, and the night-blooming flowers, which are white but which exude a soft, penetrating perfume attractive to moths as well as to man.

Water, Birds, Etc. Aquatic plants often spread their pollen upon the water and let it float to the neighboring blossoms. Trumpet vines and many other plants whose blossoms have long tubes, save their nectar for the humming birds, whose feathers catch the pollen, and

other plants invite the long-tongued moths. Conspicuous among the latter are many members of the Orchid Family.

USES. Man makes use of his knowledge of cross-fertilization in the production of strong, healthy plants by painting the pistil of one choice plant with the pollen from a healthy individual of the same or an allied genus. By this means numerous new varieties of plants have been grown, and the pleasing characteristics that have suddenly made their appearance in one individual of a species may be made permanent. Such work, originated by Darwin, has been carried on by many scientists and has reached its highest practical achievement in the work of Luther Burbank. See MENDEL'S LAW; BURBANK, LUTHER; POLLEN; FLOWER; Jordan and Kellogg, *Some Scientific Aspects of Burbank's Work*.

Cro'ton Aqueduct, Ak' we duk't. See AQUEDUCT.

Croup, Kroop, a disease characterized by a hoarse cough, which usually attacks children. It occurs most frequently at night and is accompanied by labored breathing and sometimes by suffocation. The attacks may last several hours and are usually followed by slight fever. This form is called false croup. Membranous croup, is really diphtheria of the larynx and is characterized by a membranous formation similar to that occurring with diphtheria, which sometimes causes the patient to choke to death. The treatment of croup is fairly simple, though a physician should be called to determine the exact nature of the affection, as more serious diseases with croupy symptoms result fatally if specific treatment is postponed. For ordinary croup one of the best treatments is inhalation of steam, which may be followed by very small doses of bromide.

Crow, a bird of the Crow Family. Its large size and uniform blue-black plumage enable one easily to distinguish the crow from all other birds. In the spring the huge, bulky nest is made of large sticks, sods, moss, grass, etc., and is placed usually in large trees at a considerable height. Four to eight bluish-

CROW

green, brown-spotted eggs are laid. The nesting season begins early in April and several broods are raised. At this season the crow is a useful bird, following the plow as it turns up the fresh earth, and picking up the insect larvæ and other life which has been unearthed. Later in the summer the crow changes its diet from insects to young birds, chickens, eggs and corn, and at this season does considerable damage. In the fall the birds gather in large companies and repair nightly to regular roosting places. In winter crows gather in large flocks along the seashore and feed upon mollusks and other animals cast up by the tide.

The crow ranges in North America from Hudson Bay to the Gulf of Mexico and is migratory only in the northern part of its range. Crows are keen observers and are not easily trapped or shot.



CROW

Crow, a warlike Indian tribe that sided with the whites and became a useful ally in the wars against the Sioux. There are now about 2000, mostly living upon reservations in Montana.

Crow Blackbird. See GRACKLE.

Crowfoot Family. See BOTANY, subhead *Classification*.

Crowned Pigeon, *Pij' un*, the largest of living members of the Pigeon Family, being upwards of 34 inches in length. They are confined to the Solomon and Papuan islands, and about eight species are known. The crowned pigeons are bluish or slate-gray in color, with chest-

CRUSADES

nut on the wings and back and a white bar on the wings. The head is surmounted by a large, fan-shaped, bluish crest of loose feathers. Little is known concerning the habits of these birds. Incubation of the eggs occupies 28 days, or 12 days longer than in the typical pigeons. The largest and best-known species is the great crowned pigeon.

Crown Glass. See GLASS.

Crucible, *Kroo' si b'l*, a vessel used in chemistry and the arts to heat substances that require high temperature in fusing and melting. It is made in several different forms, conical, circular or triangular, closed at the bottom and open at the top, and sometimes provided with a lid to keep in the heat. Crucibles are of various sizes, from that of a lady's thimble to that of a cask. Fire clay, graphite, lime, aluminum, platinum, silver or porcelain may be used in making crucibles, depending upon the purpose for which they are constructed. The most common and cheapest form is the Hessian crucible, round in shape and made of equal parts of fire clay and coarse sand molded together when wet and then dried. For melting brass and other metals the graphite crucible is preferred; it is made of graphite, fire clay and fine sand. See BRASS; GRAPHITE; CLAY.

Cruiser, *Krooz' er*. See WARSHIP, subhead *Cruiser*.

Crusades, *Kroo sades'*, (from Latin *crux*, cross), the religious expeditions of Europeans against the Mohammedans in the 11th, 12th and 13th centuries for the recovery of Jerusalem and the Holy Land. The name is derived from the fact that the Crusaders took the vow and wore the badge of the Cross. It had long been the custom for European Christians to make pilgrimages to the sepulcher of Christ at Jerusalem. In 1071 the Seljukian Turks captured Jerusalem, and their brutal treatment of the pilgrims aroused western Europe. Other causes also contributed to the Crusades. The rulers of the West feared that the Turks would invade Europe; the masses of the people were oppressed and impoverished by feudalism, and were ready for

almost any change; and the spirit of chivalry and the prospect of gain doubtless influenced many.

FIRST CRUSADE (1096-1099). Peter the Hermit, who had made a pilgrimage to the Holy Land, returned full of indignation at the conditions that existed, and began to preach a crusade. Everywhere he aroused great enthusiasm, and at the Council of Clermont in 1095 his words and the eloquent appeal of Pope Urban II so moved the people that with one accord they shouted *Deus volt*, "God wills it," and this became the slogan of the Crusades.

The first to go were unorganized and undisciplined bands that started under the leadership of Peter the Hermit and others, without waiting for adequate preparation. Nearly all perished before Constantinople was reached, and the miserable remnant were overcome in Asia Minor by the Turks. But in 1096 five well-organized armies departed by different routes for Constantinople, under the leadership of Godfrey of Bouillon, Bohemond, Prince of Tarentum, Raymond of Toulouse, Robert of Normandy, Robert of Flanders and others. They met at Constantinople about Christmas, 1096, and, after some delay, passed over into Asia Minor and laid siege to Nicæa, which fell in June, 1097. They then defeated the Eastern army at Dorylæum and proceeded against Antioch, which was captured in June, 1098, after a siege of seven months. The Mohammedans now in turn besieged the invaders in Antioch, but were finally routed, and the way to Jerusalem was opened.

When that city was reached only about 20,000 Crusaders remained of the 300,000 who had started from Europe. They captured Jerusalem by reckless daring, July, 1099, after a siege of five weeks. Godfrey was elected "Baron and Defender of the Holy Sepulcher," and was left with a small band of followers to defend Jerusalem; Bohemond held Antioch; Baldwin occupied distant Edessa; and the remaining Crusaders returned home. During the next 50 years the defense of these kingdoms and of the pilgrims was

aided by two new orders, the Knights Templars and the Knights Hospitalers.

SECOND CRUSADE (1147-49). In 1147 the Saracens recaptured Edessa, and the Pope, assisted by St. Bernard of Clairvaux, aroused Louis VII of France and Conrad III of Germany to rescue the Christians in the East. The march was disorderly, contentions arose with the Byzantine ruler at Constantinople, the Greek guides proved treacherous, and the defeated army wasted away in Asia Minor.

THIRD CRUSADE (1189-91). The capture of Jerusalem by the famous Saladin in 1187 was the cause of the most romantic of all the Crusades, led by the three principal monarchs of Europe—Frederick Barbarossa of Germany, Philip Augustus of France and Richard the Lion-Hearted of England. Barbarossa was drowned at Pisidia in 1190, but his forces aided the French and English at the siege of Acre. This city fell after 23 months, but the jealousy of the two kings led Philip to give up the enterprise; and in 1192 Richard was glad to sign a truce with Saladin by which the seacoast from Tyre to Jaffa should remain in the hands of the Crusaders and Christian pilgrims should not be molested by the Moslems.

FOURTH CRUSADE. This is known as the false Crusade, since it never reached Palestine. Among its chief promoters were Godfrey of Champagne, Baldwin of Flanders, Simon de Montfort and Boniface of Montferrat, the latter being chosen leader. The Crusaders assembled at Venice, which was to supply vessels and provisions; but the Venetians shrewdly directed the expedition against the Dalmatian city of Zara and then against Constantinople. This city was taken, and Baldwin of Flanders became King of the Latin Empire established there in 1204.

LATER CRUSADES. The first four Crusades are the only ones to which the same numbers are given by unanimous consent. There were many other expeditions, but they accomplished little. What is generally called the *Fifth Crusade* (1228-29)

was somewhat tardily undertaken by Frederick II of Germany in fulfillment of a vow. Through negotiations with the Mohammedans he gained possession of Jerusalem, but was bitterly denounced by Pope Gregory IX for making terms with the infidels. The *Sixth Crusade* (1248-54) was caused by the capture of Jerusalem by the Mohammedans in 1244. Louis IX of France (St. Louis) led an expedition into Egypt and Palestine, but was defeated, and concluded a useless truce for ten years. Louis organized another expedition and undertook the *Seventh Crusade* (1270-72), but died before Tunis on his way to Palestine. The Crusade was carried on for a time by Edward I of England, but accomplished nothing of value. After this, Palestine was left to the infidels; Acre, Antioch and Tripoli remained in the power of the Templars, however, until 1291.

The name Crusade was also given to other military expeditions undertaken for religious purposes. The most important of these were the wars of the Spaniards against the Moors, the persecution of the Albigenses and the conquest of Prussia by the Teutonic Knights.

CHILDREN'S CRUSADE (1212). In 1212 Stephen, a shepherd boy of France, declared that God had appointed him to crush the Saracens. The religious fervor of the times led children to flock to him until he was joined by 30,000 boys and girls, most of them under 12 years of age. They were enticed on board seven ships by merchants at Marseilles. Two ships went down off the coast of Sardinia, and when the other five reached Alexandria the children were sold as slaves. Only a small number ever regained their liberty. Another expedition started from Germany at about the same time under a boy named Nicholas. He crossed the Alps with 20,000 children and reached Genoa in 1212. The children were persuaded to return, but many died on the way, and others took service in the various towns on their route. Few ever reached home.

RESULTS. Although the Crusades failed in their intended object, they ex-

ercised great influence in European history. They contributed to the growth of the Italian seaports and greatly enriched Europe by increasing the commerce between the East and West; they enlarged the wealth and power of the Church; they helped to centralize and unify government by diminishing the numbers and power of the independent nobles; they broadened the intellectual horizon of men, as the civilizations of the East and West mingled for two centuries, and paved the way for the Renaissance two centuries later. Consult *The Crusades*, *Story of the Nation Series*, and *The Talisman* by Sir Walter Scott.

Crustacea, *Krus ta' she a*, a group of familiar Arthropoda, and, with the group Insecta, or the Insects, forming the two most important divisions. The Crustaceans are aquatic, gill-breathing animals having many highly-differentiated appendages always borne in pairs. The foremost pairs are the antennæ, or feelers; the others are motor, grasping or crushing organs and are generally much jointed and branched. The body characteristically has three main regions: the head, made up of a constant number of segments; the thorax upon which the chief motor appendages are borne; and the abdomen. Each of these regions is made up of several segments, but occasionally the head and the first segment of the thorax are united into one, called a cephalothorax, and have a horny covering on the back. There are ordinarily several pairs of eyes, some simple and some compound; these are frequently borne upon relatively long stalks, which gives them a wide range of vision.

All Crustaceans pass through a similar larval stage, and in this form are known as a nauplius. The most common members of the group are the crabs, lobsters, barnacles, crayfish and water fleas. These are to the sea what the insects are to the land, ridding it of much of the decaying animal tissue; many, too, are commercially valuable because of their wide use as food. See CRAB; CRAYFISH; LOBSTER; BARNACLE; ZOOLOGY, subhead *Classification*.

Cry'olite, a native fluoride of aluminum and sodium. The mineral is transparent, or partly so, and the purer varieties are white or colorless. It occurs in massive, also in crystalline, form, and has a glossy luster. It is used in the manufacture of alum, soda and certain kinds of glass. Large beds of cryolite are found in Greenland, and it is also found in the western part of the United States.

Cryp'togam, a class of plants formerly called flowerless, but now distinguished as those which reproduce by spores rather than by seeds. The cryptogams vary so greatly in structure that they cannot be typified by any one plant but must be studied in classes. Representatives of these classes are ferns, mosses, algæ and fungi. Scientifically they are classified as: Thallophytes, the fungi and algæ; Bryophytes, mosses; and Pteridophytes, ferns. Cryptogams are opposed in method of reproduction to the phanerogams, or seed-producing plants. See SPORE.

Crys'tallog'raphy, the science which treats of crystals. Most inorganic substances when solidifying tend to form in crystals. Substances which do not possess this tendency are called amorphous. Rock salt, rock candy, alum and quartz are good examples of crystalline substances. If compared with each other, it will be seen that each has a system of crystallization different from the other. As comparison is extended, the varieties of crystals continue to increase, and one soon reaches the conclusion that there are thousands of different crystals. All these, however, can be reduced to six systems, as follows:

1. **THE REGULAR CUBE SYSTEM**, consisting of crystals having three lines or axes of equal length and crossing others at right angles at the middle point. The ends of the axes terminate in the center of the planes or faces of the crystal. Iron pyrite, gæna, common salt, copper, silver and gold form crystals belonging to this system.

2. **THE SQUARE PRISMATIC SYSTEM**, in which the axes cross at right angles

at the middle point, but one axis may be longer than the other. The ends of the short axes may terminate in the center of the faces or at the edge, and the ends of the long axis may terminate in points where all the faces meet. Crystals formed on this plan are pyramids, or the crystals may form two pyramids, with their bases together. Calomel, binoxide of tin and yellow prussiate of potash are good examples.

3. **THE RIGHT PRISMATIC SYSTEM**, in which the axes are all of unequal length, but are placed at right angles to each other. The crystals are in the form of right rhombic prisms and rhombic-based octahedrons. Topaz, sulphur and nitrate of potash are good examples.

4. **THE OBLIQUE PRISMATIC SYSTEM**, in which two axes are at right angles to each other, and the third is inclined. The axes are all of different lengths, and the crystals form oblique prisms. Salsoda, borax and copperas (sulphate of iron) are familiar examples.

5. **THE DOUBLE OBLIQUE PRISMATIC SYSTEM**, in which there are three axes of unequal length, intersecting obliquely. This produces irregular crystals, which are often difficult to classify. Blue vitriol (sulphate of copper) is the most common example.

6. **THE HEXAGONAL RHOMBOIDAL SYSTEM**. This system has four axes, three of which are in the same plane and inclined to each other at angles of 60° , while the fourth is perpendicular to them. This system produces regular six-sided prisms, as seen in calcite and other forms of limestone.

Cu'ba, **The Republic of**, a republic including the Island of Cuba, the "Pearl of the Antilles," and numerous small islands, of which the Isle of Pines, with an area of 1180 sq. m., is the most important.

Cuba lies between $74^\circ 1'$ and $84^\circ 57'$ west longitude, and $19^\circ 48'$ and $23^\circ 13'$ north latitude. Its eastern end is directly south of New York City, and its western end touches the meridian that crosses Michigan, eastern Indiana and Western Georgia. It is farther west

than any portion of South America, and 300 m. farther west than the Panama Canal, and 100 m. south of Key West, Fla.

SIZE. Its extreme length from east to west is 780 m. (along a medial line, 730), about the same as that of California (750 m.) and equal to the distance from New York City to Cincinnati (752 m.). Its breadth, which averages about 50 m., varies from 22 to 160 m.; while its area of 44,164 sq. m. makes it about the size of New York, Pennsylvania, Louisiana or Mississippi.

POPULATION. According to the census of 1919 the population was 2,898,905, a gain of 848,925, or 40.3 per cent, over 1907. The number of inhabitants to the

west of Havana, includes the prominent range of the Organ Mountains, 2500 ft high, and their outlying hills and mesas. In the central district the highest single point, Pico Potrerillo, has an altitude of 3000 ft., while the eastern district boasts of Monte Turquino, which towers to an elevation of 8000 ft. The coast of Cuba is very irregular, and is broken by many reefs and small islands, behind which are lagoons, salt marshes or submerged lands covered with mangroves. There are, however, numerous large and very excellent harbors, pouch-shaped and equal to the best elsewhere in the world.

RIVERS. Although Cuba is exceptional, in that many of her smaller mountain streams disappear and find their way to



square mile is 59.4, being slightly in excess of Kentucky, and slightly less than Indiana. The population is nearly equal to that of Indiana, and in comparison with the states of the Union, Cuba would rank 10.

SURFACE. There are three distinctively mountain districts,—the eastern, central and western—between which lie two extensive sections of open, flat or rolling plains, broken by occasional hills a few hundred feet high. The eastern mountain district is, in the main, an elevated plateau from 1000 to 2000 ft. above the sea, but deeply scored by streams; the central is, for the most part, not so high, but decidedly rough and broken; while the third, which begins

the sea through underground channels, there are perhaps 200 streams large enough to be called rivers. Most of these are short and of little importance to navigation, but the Sagua la Grande is navigable for perhaps 20 m., while vessels of 200 tons ascend the Cauto for a distance of 60 or 75 m. Many of the rivers can, however, be utilized for the development of electric power whenever conditions make this desirable.

CLIMATE. Cuba has a tropical climate, with a mean annual temperature of 78°, while the maximum seldom goes above 90° or the minimum below 50°, because the almost uniform temperature of the ocean prevents sudden changes and great extremes. There is a dry season from

November to April, as about two-thirds of the annual precipitation occurs during the hotter months; and in some parts of the island this makes irrigation necessary on relatively small areas. At Havana, however, the mean annual rainfall is over 40 inches, and in some years exceeds 90 inches, while conditions throughout the island are, on the whole, extremely favorable to agriculture. In general, too, the climate is healthful, so that, since the complete elimination of yellow fever, science is waging an effective warfare against tuberculosis and other unnecessary physical ills which had been prevalent only because unsanitary conditions had been tolerated.

MINERAL RESOURCES. These include extensive and valuable deposits of beautiful marble, especially in the Isle of Pines; a rich, white limestone, which is easily worked but hardens with age; a hard, blue limestone and some sandstones; asphalt, obtained at Cardenas; and copper deposits, once the greatest producers in the world, and for many years the principal source of supply for the United States, which, as long ago as 1835, took \$2,000,000 worth of these per annum. Throughout the island there are also bituminous deposits from which many valuable products are derived. But the most fully developed mineral resources are those which now furnish annually to American smelters approximately 600,000 tons of iron ore specially valuable for the manufacture of Bessemer steel.

FORESTS AND LUMBER. It was estimated, in 1904, that more than 3,600,000 acres of Cuban soil were still covered with timber, much of this being primeval forest in which, strangely enough, the pine and other trees of the temperate zone stand side by side with the palm, mahogany, ebony, rosewood and other varieties which are distinctively tropical. The royal palm, which is at once the most beautiful of their trees and most characteristic of the Cuban landscape, grows to a height of 100 ft., or more, and, like the coconut and corajo palm,

contributes very largely to the needs of the people.

AGRICULTURE. Because of its fertile soil, its superb climate and its proximity to the great markets of the Eastern States, agriculture is not only the principal occupation, but also furnishes employment to at least 40 per cent of the people.

Soil. In the uplands of Cuba, the soil is mostly a deep residual clay colored red or black, or reddish-black. The alluvial lowlands, because of the considerable annual wash from the mountains, are of extreme and apparently inexhaustible fertility.

Products. Corn, sweet potatoes and vegetables of many kinds are produced in large quantities, but principally for local consumption. Rice, which is a staple article of diet, has been successfully grown, but only in small quantities. The production of coffee, which was formerly an important crop, is no longer sufficient to meet local needs, while stock raising, also an important industry in earlier times, has not recovered from the losses incident to the prolonged struggle for independence. Since 1900, however, large corporations have developed fruit growing to enormous proportions, and great quantities of oranges, grapefruit, pineapples and bananas from Cuba find a ready sale in the American market.

Still more important is the tobacco industry, for which the island is perhaps best known. One-tenth of the cultivated area is devoted to this crop, 95 per cent of which is produced west of Havana, or in Havana Province. When grown under cheesecloth, Cuban tobacco equals the finest Sumatra leaf; and this industry is now exceedingly prosperous. However, since the end of the 18th century, the production of cane sugar has been, as it still remains, the most important source of Cuban wealth. One-half of the area now under cultivation is devoted to cane; and in 1918 the island produced 4,020,160 tons of sugar. This was ten times as much as Louisiana or Porto Rico, more than one-third of the world's supply of cane sugar and about one-

fourth of the world's total from both cane and beets.

MANUFACTURES. In Cuba skilled labor is not easily obtained. Moreover, the well-developed manufactories of the United States can easily supply the Cuban market at prices fair to both producer and consumer, while her leaf tobacco, raw sugar, iron ore and other products enter the American market on favorable terms. Consequently, manufacturing, which has never assumed any considerable importance in Spanish times, is still limited principally to the making of cigars and cigarettes for local consumption and for that European trade which has survived the changes incident to the Spanish-American War.

COMMERCE AND TRANSPORTATION. With a coast line of more than 2000 m., and many harbors equal to the demands of small boats, Cuba maintains a considerable internal commerce in spite of poor roads and inadequate railway facilities; both of which, however, are being improved with creditable rapidity. Havana now has railway connections with Pinar del Rio on the west, and 109 m. distant; while 70 per cent of the entire island is tributary to the line that connects Havana with Sanitago, or to the shorter lines operated in connection with it. There are some 3000 m. of telegraph. The foreign commerce of Cuba is largely with the United States. Yet the ships of many nations are found in her more important ports, such as Matanzas, Cienfuegos and Santiago; while the magnificent harbor of Havana fairly teems with them. For 1921, the commerce of the Philippines with the United States amounted to \$157,000,000; that of Cuba exceeded \$823,000,000; Central America \$120,000,000. The principal articles of export are sugar, tobacco, cigars, iron and manganese ore, fruit, coffee, cocoa, molasses, and sponges. As a purchaser of American goods, Cuba stood seventh among the nations, being ranked only by England, Canada, France, Italy, Belgium and Japan.

GOVERNMENT. The constitution of the Republic of Cuba was adopted by a

representative convention on Feb. 21, 1901, certain other provisions being added later as required by the United States, in consideration of her services in terminating the war which gave to the island its independence. On May 20, 1902, the first president of the republic assumed the duties of his office. The government is republican in form, and the president serves four years. He is not eligible for a third successive term. He appoints the members of his cabinet, and they are responsible to him for the administration of their departments. The Congress, which holds annual sessions, consists of two houses—the Senate, made up of four members from each of the six provinces, and the House of Representatives, with one member for each 25,000 inhabitants. The judges of the Supreme Court are appointed by the president with the approval of the Senate. Changes in the constitution can be made only by two-thirds vote of both houses. The provinces elect their own governors and have control of local affairs. Every male Cuban over 21 years of age, and not mentally incapacitated or convicted of crime, has the right to vote. Spanish residents who have been on the island since Apr. 11, 1899, and other foreigners who have resided in the island since Jan. 1, 1899, also exercise the franchise; but those who have established a residence since the latter date must prove five years' residence before they can be naturalized.

EDUCATION. Under the military government maintained by the United States from Jan. 1, 1899, to May 20, 1902, free public schools were established throughout the island and approximately \$10,000,000 expended for the construction of school buildings, their equipment and maintenance. In the summer of 1900 a thousand Cuban teachers were sent to Harvard University to pursue brief educational courses, and 200 more enjoyed similar advantages in 1901. The school system thus inaugurated has since received the loyal support of the Cuban Government. Hence, wonderful progress in the elimination of illiteracy has been

made, and the census of 1907 showed that a majority of the voters and 57 per cent of the population over ten years of age could read and write.

PUBLIC INSTITUTIONS. The establishment of schools for the training of nurses has been of great benefit, both because it has assured better care for the sick and because it has opened to many dependent young women the opportunity for self-support. The Academy of Sciences, the School of Arts and Trades and the University of Havana today render important service in many ways, and other public institutions similar to those in the United States are gradually developing. Of these, perhaps none is more important than the Cuban Agricultural Experiment Station 12 m. south of Havana.

CITIES. The most important cities besides Havana, the capital, are Matanzas, Cienfuegos and Santiago, which have excellent harbors, as stated elsewhere.

HISTORY. Cuba has had an interesting history. Reached and greatly admired by Columbus on his first voyage, it was twice revisited by the great discoverer; but was first circumnavigated by Sebastian de Ocampo, in 1508. Although given several different names by the Spaniards, the island has persistently kept that by which it was known to its earliest inhabitants, those peace-loving Indians, who gradually disappeared under the harsh rule of their European masters. The Indians being found physically unequal to that heavy toil necessary in field and mine, negroes were brought from Africa as early as 1523, and slavery, thus established, continued until 1886, an important factor in the history of the Cuban people.

Havana, founded in 1519, took its name from an old Indian district. It soon became the foremost city of the island, but was destroyed by the French in 1534, and again in 1554; was captured by the Dutch in 1624; and was many times attacked by pirates. This led to the construction of its now famous fortifications, La Fuerza, El Morro and La Punta. Havana became the capital in

1552. Following the Seven Years' War, during which the island was held temporarily by the English, Cuba enjoyed comparative prosperity, at intervals; but the needs of her people were never fully appreciated in Spain, and consequently the government was neither of such character nor so administered as to serve the best interests of the island. Thus, injustice roused a spirit of hostility, which gradually developed into the spirit of insubordination. Insurrections became frequent. Whenever and wherever the hand of authority was temporarily weakened, rebellion broke out, and yet Spain refused to consider the transfer of Cuba to the United States, refusing in 1848 an offer of \$100,000,000. At last war broke out again in 1895, and the people, groaning under the cruel and oppressive measures introduced by General Weyler, won the sympathy of the world by their determined and heroic resistance. Forced to interfere in the cause of humanity, and because of the apparently premeditated destruction in Havana Harbor of the *Maine*, an American warship, the United States recognized the independence of Cuba on Apr. 19, 1898; compelled Spain on Aug. 12, 1898, to relinquish all claim to Cuba; and, after restoring peace, established the republic on May 20, 1902, retaining only such coaling and naval stations as were deemed necessary in order to preserve the independence of the island and insure protection to life, property and individual liberty.

GOVERNORS AND PRESIDENTS. Among the governors of Spanish times were Hernando de Soto; the discoverer of the Mississippi River; Gen. Luis de las Casas, whose administration, 1790-1796, was one of the best in the history of Cuba; Miguel Tacon, 1834-1839, a man of great force whose faults and virtues stood out in boldest contrast; and Leopoldo O'Donnell, under whom in 1844 there was much cruel and bloody persecution of the negroes. During the period of American military government, Maj.-Gen. John R. Brooke, Dec. 13, 1898-Dec. 20, 1899, and Maj.-Gen. Leonard Wood, Dec. 20, 1899-May 20, 1902, directed that

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reorganization through which the Republic of Cuba came into existence. Between the terms of Pres. Tomas Estrada Palma, May 20, 1902-Sept. 28, 1906, and Pres. José Miguel Gomez, Jan. 28, 1909-1913, American troops maintained order throughout the island, and the administration of public affairs was directed by Hon. C. E. Magoon, as provincial governor. In 1912 the Conservative Party elected for president, Gen Mario Menocal. Dr. Alfredo Zayas is now President.

Cu'beb, the dried, unripe fruit of the cubeb pepper, a small, climbing shrub of the Pepper Family. When picked, cubebes are small, spherical bodies with an aromatic odor, which becomes irritating as they dry. The drug produced from them is used as a stimulant and a cough remedy. They are also the source of an oil of cubebes, used medicinally. The inhalations of the smoke of burning cubebes is said to be efficacious in cases of asthma and hay fever. See **PEPPER**.

Cuckoo, *Kook' oo*, **Family**. Three kinds of cuckoos live in the United States, two of which are abundant in the eastern part of the country. The yellow-billed cuckoo is a trifle larger than the robin. Its back is brownish-gray, with a gloss of green; its under parts, whitish; the wings, brownish; and the outer tail feathers are tipped with a large, white spot. The lower part of the bill is yellow, tipped with black. The black-billed cuckoo is similar to the last named, differing in having dusky tail feathers with very small, white tips and in both mandibles being black.

The nest of the cuckoo is usually little more than a platform of sticks, although rarely a larger, well-formed nest is made and lined with ferns and leaves. Its location is usually in a bush or vine, but occasionally it is placed in a large tree. Two to five eggs are laid, which hatch in about 14 days. When hatched, the young are totally naked, but in several days a few blue pinfeathers appear and these continue to develop until the little body is fairly bristling with these queer appendages. Twenty-four hours before the young birds leave the nest, these quills,

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each of which contains a feather, begin to burst, and the young cuckoo is speedily furnished with a coat of feathers like its parents, but the tail is shorter.

The cuckoo is usually a solitary bird flitting noiselessly through the bushes, looking for its insect food. As it feeds largely on tent caterpillars and on other hairy caterpillars that only a few birds will touch, the cuckoo becomes at once a bird of great value to the farmer and orchardist. The call note is a clucking sound, which resembles the syllables "kuk, kuk, kuk, kuk, kyow, kyow, kyow." By some people who believe that this peculiar song predicts rain, these birds are called "rain crows."

The European cuckoo builds no nest, but deposits its eggs in the nests of other birds, one egg to a nest, leaving the young to be cared for by the birds that hatch the eggs.



YELLOW-BILLED CUCKOO

Cu'cumber, a vine and the fruit of the vine of the Gourd Family. The vine has large, five-angled, heart-shaped leaves and large yellow flowers which produce an oblong, rounding fruit. The cucumber is valued only when picked green, as when yellow and mature it is tough and full of seeds. It is eaten fresh or pickled in salt, vinegar or oil and so preserved for winter use. Cucumbers are grown between the hills of corn in cornfields and are prolific producers. They are raised extensively for canning factories. Cucumbers are native in Egypt and southern Asia and were brought to Europe during the Crusades. They have been raised in

the United States since the time of the coming of the first colonists.

Cucumber Tree, a member of the Magnolia Family, named because its young fruit cones resemble cucumbers in shape. It is a handsome, stately tree, with a straight trunk growing from 60 to 80 ft. high and branching in beautifully regular form. The leaves are oval and sharp-pointed, slightly downy underneath; in color they are a rich, dark green. The flowers which appear in May are large, with three green sepals and from six to nine pale blue or pale yellow petals. There are large groves of the cucumber tree near Niagara Falls, but its home is generally farther south. Other magnolias are called by this name, but only the species with the sharp-pointed leaves is the true cucumber tree.

Cul'om, Shelby Moore (1829-1914), United States senator, born in Wayne County, Ky. He received a classical education, was admitted to the bar and began his practice at Springfield, Ill. He was elected to the State Legislature in 1856 and 1860; served in the House of Representatives from 1865 to 1871; returned to the State Legislature in 1872; and served as governor of the state from 1877 to 1883, when he resigned to enter the United States Senate, holding his seat until 1913. His long and honorable career in the Senate has established for him a high reputation among the nation's statesmen. He has been active and influential in securing legislation, and has been especially interested in railroad regulation, serving as chairman of the Senate committee on interstate commerce in 1885, and advocating the law of 1889. In 1898 he was chairman of the commission which established United States government in Hawaii. In 1911 he published a book of personal reminiscences under the title of *Fifty Years of Public Service*.

Cul'tiva'tor, a farm implement designed for tilling the ground after the crops have been planted. Its object is to keep the surface soil loose and moist and to prevent the growth of weeds. In general, a cultivator consists of a light

frame set with shares, or small shovels, and drawn by horse power. The first cultivators had but a single shovel; those in common use at present are fitted with from four to fourteen shovels, and are two- and three-horsepower, riding or walking cultivators. Two-row cultivators are becoming popular in the prairies. A good cultivator should have axles with dustproof bearings, accessible, easily-worked levers, and a device for distributing evenly the weight of the rider. All parts should be made of the best material and well put together.

Cum'berland, Md., the county seat of Allegany Co., on the Potomac River, 178 m. n.w. of Baltimore, and on the Baltimore & Ohio, the Pennsylvania and other railroads. It is also the western terminus of the Chesapeake and Ohio Canal. The city is surrounded by hills, through which to the westward is a deep gorge called the Narrows. The site of the city and the surrounding country are remarkable for the beauty of their scenery. Cumberland has an extensive trade in coal and is the second manufacturing center in the state. The manufactories include flour mills, glass works, iron and steel mills, railroad shops and tanneries. The city is also the center of a large wholesale trade. The waterworks and electric-lighting plant are owned by the city. The first settlement was made in 1750. In 1754 Ft. Cumberland was erected. The town was laid out in 1763, but it was not chartered as a city until 1850. Population in 1920, 29,837.

Cumberland Mountains, a portion of the Appalachian system extending in a northeasterly and southwesterly direction through Tennessee and Kentucky. That portion included in Tennessee is a broad plateau covered with forests of oak, hickory, maple, ash and chestnut. The highest peaks rising from this plateau are not more than 2500 ft. in elevation. Bituminous coal is mined in the Cumberland Mountains in Tennessee.

Cumberland Road. See NATIONAL ROAD.

Cumin, *Kum' in*, or **Cummin**, a drug obtained from the fruit of a Mediterran-

ean herb of the Parsley Family, also known as cumin. The plant has the same habits of growth and aromatic fragrance as caraway. The fruits are seedlike and have long been known in medicine as a source of a drug used for intestinal diseases.

Cum'mins, Albert Baird (1850-), an American lawyer and statesman, born in Carmichaels, Pa. In 1869 he graduated at Waynesburg Academy, after which he studied law in Chicago, where he was admitted to the bar in 1875 and practiced for three years. In 1878 he removed to Des Moines, Iowa, and soon attained prominence in his profession and in politics. He became a member of the State Legislature in 1888, and governor in 1902, serving for three terms. In 1908 he was elected to the United States Senate to fill the unexpired term of Senator Allison, and reelected for the regular term in 1909. He became prominent as advocate of the "Iowa Idea" for a gradual reduction of the tariff, and is a recognized leader of the progressive element of the Republican Party in the Senate.

Cunard, *Ku nahrd'*, Sir Samuel (1787-1865), an English shipowner, born at Halifax, Nova Scotia. He went to England, and in company with others, founded, in 1839, the British and North American Royal Mail Steam Packet Company, which was taken over by the Cunard Steamship Company, organized in 1878. Cunard, in 1840, first established steam postal communication between England and America. He was made a baronet in 1859 and was a member of the Royal Geographical Society. See STEAMSHIP.

Cune'iform Inscriptions, the name applied to the earliest form of writing and one of the oldest systems of the alphabet. It originated in Mesopotamia and spread gradually to Armenia and to Egypt. Texts in cuneiform writing exist that are fully 6000 years old, and the latest inscriptions date from the third century B. C. The characters are wedge-shaped, often complicated in form, and the task of deciphering them is very

difficult. Often each character represents a syllable or a word, rather than a letter, and only in a few instances are there traces to indicate that these cuneiform letters were once pictorial. When these signs were first discovered by European travelers to the East, the wildest speculations were afloat as to their origin and meaning. Some thought the inscriptions on the clay tablets of Mesopotamia were astrological formulas; others, that they represented the original language of Eden. Pietro della Valla, in 1621, was one of the first to relate them to the references made to cuneiform texts in the writings of Herodotus, Plutarch and others.

One of the most interesting records found is the one carved on the side of the steep mountain of Behistun. There is recorded in three languages (Babylonian, Old Persian and New Susian) an account of a part of the reign of Darius I. The carving is at a height of 300 ft. The chief types of inscriptions are the Sumerian, or Accadian, the Assyro-Babylonian, New Susian, Old Persian and Armenian. The Sumerian is the oldest and the Assyro-Babylonian is the most important and the most complicated. The

𐎶𐎵𐎶𐎵 > 𐎶𐎵𐎶𐎵 𐎶𐎵𐎶𐎵 𐎶𐎵𐎶𐎵

BABYLONIAN INSCRIPTION

Old Persian by reason of its simplicity gave the key to all the others. The illustrations are from the Assyrian. Each character represents the syllable which

𐎶-a, 𐎶𐎵-ab, 𐎶𐎵𐎶-ib 𐎶𐎵𐎶-vb, 𐎶𐎵𐎶-bi,

follows it. Many inscriptions yet remain to be deciphered and it is not impossible but that many still remain to be discovered.

Cu'pid, or E'ros, god of love, was the child of Venus and Mars. He was represented as a chubby, naked boy with airy wings and a rosy, laughing face. He always carried his quiver full of gold-tipped and lead-tipped arrows. Cupid's love was a mortal named Psyche. See PSYCHE.

Curari, *Koo rah' re*, or **Curare**, a South American plant of the Gentian Family from which the South American Indians derived a poison for smearing their arrow tips. It was particularly useful because, although the wounded animal died from the effects of the poison, the flesh was not thus rendered poisonous to man. It acts through its power to paralyze the respiratory and motor nerves. Taken internally in small doses, it is not a strong poison but acts more as a sedative.

Curassow, *Ku' ra so*, a name given to a family of birds about the size of a domestic turkey and related to the domestic fowl. They inhabit the north-eastern part of South America and southern Mexico. The large and bulky nest is built in trees and two to six white eggs are laid. These birds assemble in large flocks. The crested curassow of Mexico is one of the best known. The bill is very large and strong, with a yellow cere at the base. The head is surmounted by a large, black crest. The plumage is glossy black, with white under parts.

Curculio, *Kur ku' li o*, a family of destructive beetles, including both the true curculios and the weevils. As a class they may be recognized by the long beak, bearing an angled antenna upon each side, and the solidly-built body with convex back. Representatives of this family do great damage to fruit and to other crops. The plum curculio lives in the leaves at the base of the tree, coming out in the spring when the fruit first appears and feeding upon the young leaves and tender bark. The eggs are deposited in tiny holes drilled in the fruit by means of the sharp beak of the mother. When the eggs hatch, the larvæ, which are tiny, white, wormlike creatures, feed about the stone and cause the fruit to wither and to drop about the time the larvæ are ready to develop into pupæ. This stage is passed in the ground; in the autumn the full-grown beetle emerges and seeks a place to pass the winter.

Infested fruit trees should be care-

fully tended. The fruit which has been attacked can be quite readily jarred from the trees, as can also the mature curculios. If a sheet is spread beneath the tree upon which both beetles and fruit are collected, both may be disposed of and the spread of the pest checked. The quince and apple curculios are also pests, though not so widely known as the plum beetle. See WEEVIL; COTTON-BOLL WEEVIL; INSECTICIDE.

Curie, *Ku re'*, **Pierre** and **Madame Marie Skłodowska**, French scientists famous throughout the world as the discoverers of radium and polonium and their wonderful properties. Professor Curie (1859-1906) was born in Paris and educated at the Sorbonne, and, after winning recognition by independent research, was made professor of physics at the Sorbonne in 1904 and a member of the Academy in 1905. Upon his death he was succeeded at the Sorbonne by his wife, Mme. Marie Skłodowska (1867-). She was born and educated at Warsaw, where her father was a university professor of physics. In recognition of their important services to science they received in 1901 the La Case prize of the Academy of Science; and, in 1903, the Davy medal of the Royal Society of London, and \$20,000 as one-half of that year's Nobel prize for physics. In 1911 Mme. Curie was awarded the Nobel prize. In 1921 she visited the United States.

Cur'lew, a bird of the Snipe and Plover Family, with long legs and a long, slender bill. They are found in many parts of the world, frequenting open stretches of country, the seashore and lake shores, where they feed on insects, mollusks, crabs and worms. Three species are common in the United States. Of these, the long-billed curlew is perhaps the best known. This bird is about two feet in length and the greater part of its plumage is cinnamon, barred and mottled with black. The nest is a depression in the ground, lined with grass, in which three or four eggs speckled with dark brown are deposited. In the spring flocks of 75 or 100 of these birds may be seen flying northward. The curlew

is hunted to some extent, but is little used as food, on account of the toughness of the meat.

The breeding ground of these birds extends from Canada to Texas and they migrate in winter to Cuba, Jamaica and Central America.

Curl'ing, a winter sport originated in Scotland, and played at first with smooth stones, to which later a handle was attached, but often now with iron pieces shaped like a flattened hemisphere with a handle on the flat surface. They may not exceed 36 inches in circumference, but weigh from 40 to 70 lb. The field of play is an ice rink ten yards wide and usually 42 yards long, on which are two *tees*, 38 yards apart, similar to the hobs used in quoits. The game is similar to quoits, is played first toward one tee and then toward the other, and commonly by four persons, each of whom in turn curls, or casts, a stone until each has shot two. The score is determined by the position of the stones with reference to the tee, which is the center of three circles that make scoring easier. A series of match games is called a *bonspiel*. Switzerland, Russia, Australia, Canada and the United States now support many curling clubs.

Cur'rant, a reliable and popular fruit borne upon a shrub of the Rose Family called the currant bush. The branches are slender and bear small but broadened leaves that effectually conceal the stems of greenish flowers and later shield the ripening fruit from the hot summer sun. Currant bushes are shallow-rooted and should be frequently cultivated to prevent their drying out. If well cared for, they should produce annually from 10 to 16 quarts of fruit to a bush. Currant bushes should be pruned to remove the old stems and allow the young to take their place. They are readily raised in orchards where the bushes may be slightly shaded. The red clusters of berries are much desired for jellies and preserves, and large profit may be made from them. There are two chief kinds, the black and the red; the white is a variety produced from the red. Black cur-

rants are more common in Europe than in the United States, and France is the leading country in their production. The London Market is the favorite American currant. The dried currant is not a currant at all, but really a small raisin, since it is the dried fruit of a small variety of grape. See GOOSEBERRY.

Cur'ency (from Latin, *currere*, to run), the medium of commercial exchange. Among economic writers there is no hard and fast line between the use of the terms *currency* and *money*. In general, however, the term *currency* applies more specifically to the aspects of money that pertain to its use as a medium of exchange, rather than as a measure and standard of value. The currency of the United States is composed of coins, government notes and bank notes. See MONEY; MINT.

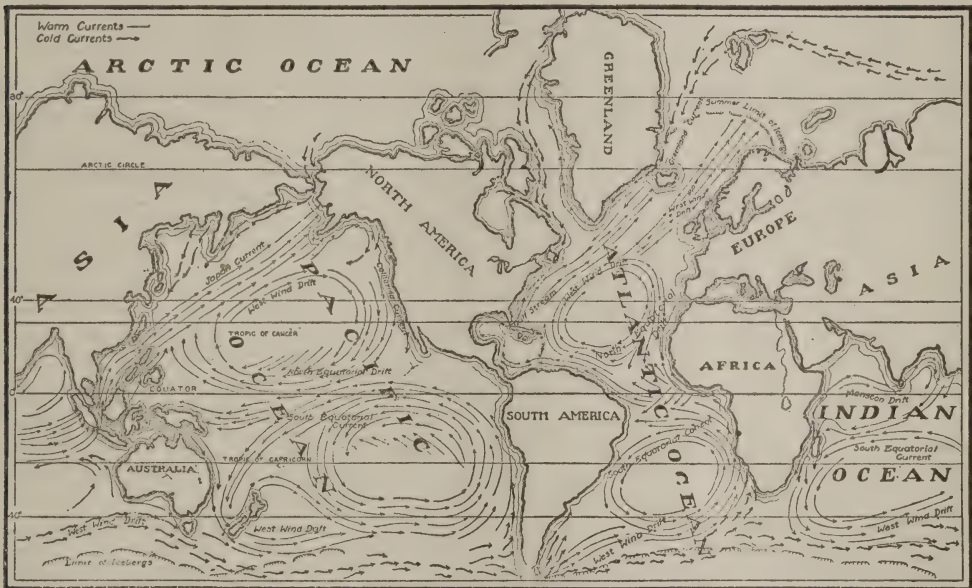
Currents, Marine, movements of water in the ocean caused by change of temperature and wind. Water condenses as the temperature lowers until it reaches 39° F. Cold water is, therefore, heavier than warm and constantly settles to the bottom of the sea. As it settles it pushes the water already on the bottom forward, so that there are always currents of cold water on the bed of the ocean moving slowly from the poles towards the equator. As these currents approach the tropics, the water becomes warmer and rises gradually. Some of it is turned backward before reaching the surface, but the greater part of it comes to the surface in the equatorial regions. It then becomes a surface current and flows in a westerly direction. Unless influenced by the wind, a current is never deflected from its course unless it strikes an obstruction. These currents due to difference in temperature are, therefore, constant and vast. They exert a great influence upon climate.

The surface currents arise in the equatorial regions. Flowing westward they are deflected towards the poles by the continents. But since the velocity of any point on the equator, due to the earth's rotation, exceeds 1000 m. an hour, and at the poles that velocity is nothing,

currents flowing toward the poles are deflected eastward, and only a portion of their waters enter the polar seas. Currents flowing from the equatorial regions are warm currents. There are also surface currents flowing from the polar to the equatorial regions, and they are cold currents. Cold currents are deflected westward by the rotation of the earth and strike the eastern coasts of the continents, while warm currents strike the western coasts. The influence of these currents on climate is seen by the contrast, in climate, between Labrador and the British Isles, which are in the same

of these, as shown on the map, the currents move in a circular course, within which is a large expanse of water having no perceptible current. In the North Atlantic this region is known as the Sargasso Sea, because of its vast accumulation of seaweed. In the South Pacific the currents are not so distinctly marked as in the North Pacific. The great general movement of water northward from the Antarctic Ocean is known as drift, and there is a similar movement in the Indian Ocean.

Curry, Jabez Lamar Monroe (1825-1903), an American educator and states-



MARINE CURRENTS

latitude. The salubrious climate of these islands and of the western coast of Europe in the same latitude is largely due to winds from the Atlantic, which have been warmed by blowing on a vast expanse of warm water brought to that part of the ocean by the Gulf Stream. The Kuro Siwo, or Japan Current, exerts a similar influence on the western coast of North America. See GULF STREAM; KURO SIWO.

The position of the land masses is such as to form two sets of currents in the Atlantic and in the Pacific. In each

man, born in Lincoln County, Ga. From the University of Georgia he went to the law school of Harvard University and began his practice of law in 1845. He served in the Mexican and Civil wars. He represented Alabama in the State Legislature and in the National House of Representatives. As a member of the first Confederate Congress he assisted in drafting the constitution of the Confederate States. From 1866 to 1868 he was president of Howard College, Alabama, and was later professor of law in Richmond College, Virginia. As the adminis-

trator of the Peabody Educational Fund and the Slater Fund, he won reputation for sagacity and forethought, and in 1885 President Cleveland appointed him minister to Spain to represent the United States at the coronation of Alfonso XIII. He wrote *The Southern States of the American Union*, *History of the Peabody Educational Fund*, *Constitutional Government in Spain* and *William Ewart Gladstone, a Study*.

Cur'tin, Andrew Gregg (1817-1894), an American statesman, born in Pennsylvania. As governor of Pennsylvania from 1860 to 1866 he rendered efficient service during the Civil War. From 1869 to 1872 he was minister to Russia, and from 1881 to 1887 he was Democratic member of Congress. He did much to improve the public school system of his state.

Cur'tis, George Ticknor (1812-1894), an American jurist and writer, born in Watertown, Mass. He graduated at Harvard in 1832, was admitted to the bar in 1836, and engaged in the practice of law in Boston until 1862, when he removed to New York. While in Boston he served for many years as counsel in such well-known suits as the Dred Scott, legal-tender and Colt revolver cases. As an author he is best remembered for a valuable constitutional history of the United States. He also published legal and biographical writings.

Curtis, George William (1824-1892), an American author, journalist and orator, born in Providence, R. I. He was a member of the Brook Farm Community, but soon abandoned the experiment. Going abroad in 1846, he traveled extensively in Europe and the Orient, and upon his return to New York City was successively editor of the *New York Tribune*, associate editor of *Putnam's Monthly*, writer for *Harper's Monthly*, in which he published a series of papers entitled "The Editor's Easy Chair," and chief editor of *Harper's Weekly*. As an orator he distinguished himself by his anti-slavery speeches before the war, as well as by his subsequent pleas for civil service reform. In 1868 he was a Re-

publican presidential elector, and was chairman of the civil service commission from 1871 to 1873. He was regent, then chancellor, of the University of New York. His best-known writings are the "Easy Chair" essays, *Prue and I*, *Trumps*, *Lotus Eating* and *The Howadji in Syria*.

Curtis, William Eleroy (1850-1911), an American journalist and author, born in Akron, Ohio. After graduating at Western Reserve University he went with a party of Pinkerton detectives to Missouri in pursuit of notorious bandits. He took part in General Custer's expedition against the Sioux Indians, and was the first to announce the discovery of gold in the Black Hills. Among the Ku Klux of the South he had no less interesting adventures. He was on the staff of the Chicago *Inter Ocean*, and for a long time was "star" correspondent for the Chicago *Record-Herald*, which position he held at the time of his death. From 1890 to 1893 he served as diplomatic agent to the South American Republics. As a reporter his "copy" was never dull; his articles pointed constantly to the need for social betterment. The vigor and vivacity of his personality was reflected in his writings, and he worked zealously to the time of his death. Among his publications are *Yankees of the East*, *The Life of Zachariah Chandler*, *The True Thomas Jefferson*, *The True Abraham Lincoln*, *The United States and Foreign Powers*, *Capitals of Spanish America*, *The Land of the Nihilist*, *Modern India* and *One Irish Summer*.

Curtius, Koor' tse oos, Ernst (1814-1896), a German historian and archaeologist, born in Lübeck. He studied in Bonn, Göttingen and Berlin, and traveled for several years in Greece, bent on archaeological researches. Upon his return he was appointed lecturer in the University of Berlin, and was for seven years tutor to the Crown Prince of Prussia (later Emperor Frederick III). He was professor of classical archaeology and philology in Göttingen from 1856 to 1863, when he returned to Berlin to become professor of ancient history and

director of the department of antiquities in the Royal Museum. To further the study of ancient history he undertook extensive excavations in the ruins of Olympia, and secured for Germany, in 1875, exclusive right to carry on these researches. His most widely-known work is the *History of Greece*. Among his other writings are *Greek Sculpture by Springs and Streams*, *Atlas of Athens*, *Ancient and Present Times*, *Classical Studies* and *The Peloponnesus*.

Curule, Ku' rool, Magistrates, consuls, prætors, censors, dictators and chief ædiles of Rome or their descendants. They were thus named because they alone could sit upon the curule chair, the old ivory throne of the kings, while discharging the duties of office.

Curzon, George Nathaniel, BARON CURZON OF KEDLESTON (1859-), an English statesman. In 1886 he entered the House of Commons as a Conservative, and later became undersecretary for India and undersecretary for foreign affairs. In 1898 he was appointed viceroy of India and a peer. He began a comprehensive scheme for reform, but resigned in 1905 because he did not approve of the division of authority between the civil and military officials in India. In 1908 he went to the House of Lords as a representative Irish peer. He married the daughter of the late L. Z. Leiter of Chicago. Baron Curzon has written *Russia in Central Asia*, *Problems of the Far East* and *Persia and the Persian Question*.

Cushing, Caleb (1800-1879), an American statesman, born in Salisbury, Mass. He graduated from Harvard in 1817 and remained as tutor for two years; was admitted to the bar in 1822 and began practice in Newburyport; was elected to the State Legislature in 1825 and at various times thereafter until 1859; traveled in Europe 1829-31; served in the lower house of Congress from 1835 to 1843, when he was appointed United States commissioner to China, where he negotiated the first treaty between that country and the United States; served in the Mexican War and

rose to the rank of brigadier-general; was appointed associate justice of the Massachusetts Supreme Court in 1852; and the next year became attorney-general of the United States. He was president of the National Democratic Convention in 1860 and supported the faction that nominated Breckinridge for the presidency. In 1866 he assisted in codifying the laws of Congress; in 1868 he went as special envoy to Bogota; in 1872 he was one of the counsel for the United States in the settlement of the Alabama Claims; and from 1874 to 1877 he was United States minister to Spain.

Custer, George Armstrong (1839-1876), an American general, born in New Rumley, Ohio. In 1861, after graduating from West Point, he entered active service in the Civil War and took part in the first Battle of Bull Run. From aid-de-camp to generals McClellan and Pleasanton he rose rapidly in position, until at the end of the war, having won distinction in the battles of Winchester, Cedar Creek and Five Forks, he received the brevet of major-general in the regular army. After the war he assisted in expeditions against the Cheyenne and Sioux Indians, in the Yellowstone expedition and in exploring the mineral fields of the Black Hills. In 1876, in his attack on 3000 Sioux Indians commanded by Sitting Bull, he and his 277 troopers were slain as they were fording the Little Big Horn in an attempt to reach the Indian encampment on the other side. He lies buried at West Point, where a statue in his honor was erected in 1876.

Custom-House, an office at which importers of merchandise must pay whatever import duties are required by the tariff law of the country. In some cases export duties are levied by a tariff, and in that case these also are payable at the custom-house of that port of entry through which they are shipped. In the United States the various custom-houses are under the direction, in each case, of the collector of the port. This official is appointed by the president with the advice and consent of the Senate, and performs his duties under the direction

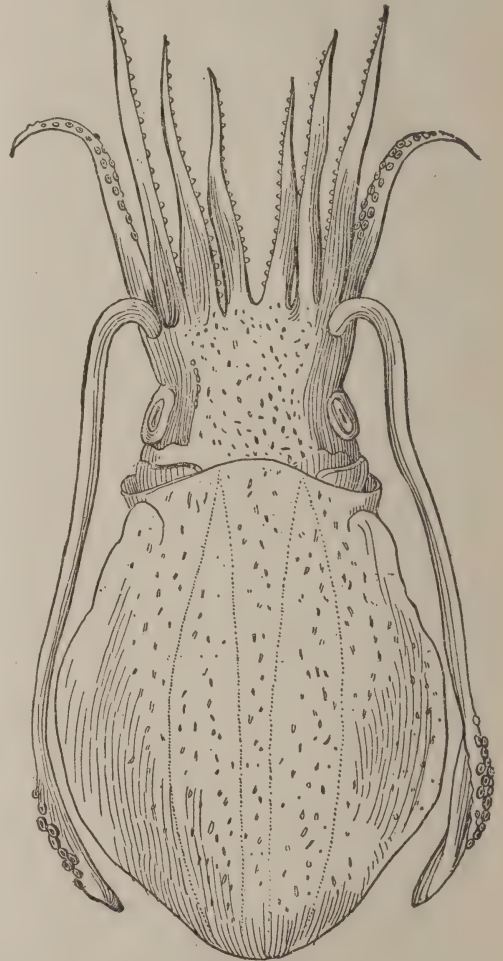
of the secretary of the treasury. Since 1791 the United States has collected in customs an average of nearly \$90,000,000 per annum—in recent years nearly four times this sum—the grand total exceeding \$16,725,000,000 in 1918.

Customs Duties. See **TARIFF**.

Cuth'bert Saint (about 635-687), Bishop of Lindisfarne and one of the most popular of the English saints. As a boy he lived a shepherd's life. He became successfully a monk at the Monastery of Melrose, superintendent of guests at the Monastery of Ripon, a recluse living in a hut on the Island of Farne, and, in 684, Bishop of Hexham, the bishopric being urged on him by the King of Northumbria. This bishopric he exchanged for that of Lindisfarne. His life was austere, marked by observance of laws of conduct even more rigid than those imposed by any monastic order. He was said to have performed miracles, and after his death several churches in England were dedicated to him. His power and influence as a saint did not wane for centuries.

Cut'tlefish", a family of marine Cephalopods, which is commercially important because of its production of sepia and of cuttlebone. The members of this family are elongated animals, having no external shell but possessing a definite distinction of head, neck and trunk. The head is spherical and bears two prominent eyes, whose structure is strikingly like those of the Vertebrates; there are also slightly developed organs of hearing. The mouth, which occupies a central position, anteriorly is surrounded by the bases of five pairs of long arms, two of which, known as tentacles, are extremely elongated and bear suckers only at the ends; the others are completely lined with little cup-shaped suckers. Covering the somewhat conelike body is a thick skin, known as the mantle, which projects over the neck and may partially conceal the retracted head. Laterally it projects in fanlike fins, which aid the cuttlefish in locomotion. Internally the cuttlefish has a cartilaginous skeleton and a protective shell at the back and

about the neck. The shell is the cuttlebone put into the cages of birds. Sepia is the dark-colored fluid exuded from the ink sac when the cuttlefish wishes to elude pursuit (See **SEPIA**). Cuttlefish move backward and forward easily by drawing in and forcing out jets of water from a funnel that proceeds from the mantle cavity.



CUTTLEFISH

Cuttlefish are ordinarily found in the deep sea, but occasionally come into shallow water. In the United States the word *cuttlefish* is sometimes used to mean only the Octopods or eight-armed Cephalopods, as the argonauts and octopuses.

Cut'worm", an exceedingly destructive caterpillar, which is the larva form of various moths of the Agrotid Family. It is a plump, fleshy "worm" of dull brown or gray color, marked with paler longitudinal lines. It feeds during the summer upon all the varieties of low-growing garden plants or small orchard stock, which it destroys by cutting off the buds, leaves and young twigs or even severing the entire stem just above the ground. It is ordinarily found only by night, since during the day it lies inactive in cracks in the ground. In the ground also it spends a short pupal stage and emerges in the late summer as a yellowish- or pearly-gray moth, whose hind wings are of lighter color than the forepair. Gardens infested with cutworms should be treated with the usual poison sprays. See INSECTICIDE.

Cuvier, Ku vya', Georges Léopold Chrétien Frédéric Dagobert, BARON (1769-1832), a French naturalist, born in Montbéliard. His education was received in the Karls Academy at Stuttgart. He succeeded Daubenton as professor in the Collège de France in 1800, and became perpetual secretary of the National Institute, in the department of physical and natural sciences, in 1803. The French Academy admitted him as a member in 1818, and in 1826 he was made grand officer of the Legion of Honor. His investigations were extensive, and that department of paleontology which deals with Mammals can well be said to have been created and established by him. He studied the structure of Mollusks, Fishes, Reptiles and fossil Mammals, and made a systematic classification of them. His lectures were distinguished for elegance as well as learning. He is the author of *The Animal Kingdom, Discourse on the Revolutions of the Surface of the Globe* and *The Natural History of Fishes*.

Cuyp, Koip, Albert (1620-1691), a celebrated Dutch painter, born in Dordrecht, Holland, the flower of a family famous in art for two generations. He was a stadholder of Netherlands, but records of the remaining facts of his life

are meager. Like Daubigny, he was pre-eminently the painter of gently flowing rivers; and his views of the Rhine and of the Meuse and its banks are executed with the utmost delicacy and poetic feeling.

Cyanogen, Si an' o jen, a colorless gas which was discovered by Gay-Lussac in 1815, and which occurs in the gases of blast furnaces. It has a peculiar, suffocating odor like that of bitter almonds, and is exceedingly poisonous. To prepare it, silver or mercury cyanide is heated to a high temperature. Cyanogen is easily liquefied and easily solidified. It burns with a bright pink flame and at ordinary temperatures is very unstable.

Cybele, Sib' e le, (in Greek, Rhea), originally a Phrygian divinity, was said



CYBELE

to be wife of Cronus and mother of Zeus. She was depicted as a stately matron on a throne, with lions beside her, or as riding in her lion-drawn car. In the rim of her crown were carved towers and parapets. Sacred to her were the cypress and box tree. Her priests were named Corybantes.

Cycads, Si kads, a group of trees or treelike plants classed together in the

Cycad Family. They are all tropical plants and are found in both hemispheres, though the species are comparatively few in number at present. There is evidence, however, that in previous geological eras they were a family of some importance and found in all zones. The cycads are rather large plants with cylindrical, scaly stems, from the top of which extend a huge whorl of long, featherlike leaves; in the center of these is the flower, which develops into a peculiar stone fruit. The cycads resemble the tree ferns and probably are in some way related through ancient forms of life which are now extinct.

Cyclamen, *Sik' la men.* See PRIM-ROSE.

Cyclone, *S'klone,* any kind of atmospheric disturbance in which there is a decrease of air pressure and an eddy of ascending air. Nearly all storms are cyclonic in character. They may be small whirls of no great extent or may involve areas hundreds of miles in diameter. They are not necessarily destructive. The violent wind storms which occur with greater or less frequency in certain parts of the United States and which destroy everything in their paths are properly designated *tornadoes*. Cyclones originate in areas of low barometric pressure and are caused by the local differences in temperature over a region of limited geographical extent. The surface air, warmed by radiation of the earth's heat, is constantly rising, while the colder air above is constantly falling. If, as often happens in certain localities, a calm prevails for some time, and this secondary circulation of the atmosphere is arrested, a condition of unstable equilibrium is created; that is, a heavy stationary layer of cold air overlying a layer of lighter air. When finally a current from without sets the air in motion, there is a swift downward rush of cold air and an inflow from all the surrounding areas, causing a flow of warm air at the center. This inflow toward a central area moves spirally, increasing gradually in force. On reaching the upper colder regions of the air the moisture is con-

densed, clouds are formed and rain usually falls. Such disturbances are marked by a double movement; the rotary whirl, which may be of tremendous velocity, and the forward progression of the entire storm over land or sea. The spiral whirl of cyclones is in the Northern Hemisphere, contrary to the direction indicated by the hands of the clock; in the Southern Hemisphere the direction is reversed, the movement being influenced by rotary movement of the earth. For the same reason cyclones in the Northern Hemisphere travel first toward the northwest, then toward the northeast; those of the Southern Hemisphere move southwest, then southeast, that is, with the prevailing winds.

Cyclones are presaged by a halo around the sun or moon, by oppressive, warm air, a fall of the barometer, gloomy skies and shifting winds, which finally develop a rotary movement with a strength proportional to the differences of atmospheric pressure. Cyclones develop greater force over the oceans than over continents. The terrific cyclones of the torrid zone are called hurricanes and typhoons. See STORM; TORNADO; HURRICANE; WATERSPOUT.

Cyclops, *S' klops,* in Greek mythology, one of a race of human giants with but one eye each, who were sons of Uranus and Gæa. They forged thunderbolts and otherwise worked as smiths in the workshop of Vulcan, which was under Mt. Etna. The name is also applied to the many offspring of Neptune and a sea nymph, cannibal giants, lazy and lawless, supposedly dwelling on western Sicily, where they tended sheep. Of these the most prominent was Polyphemus. See POLYPHEMUS.

Cynics. See ANTISTHENES.

Cypress, *S' press,* a name given to a number of beautiful trees and shrubs of the Pine Family, growing mostly in moist, warm climates and often found knee-deep in the water. In general they are resinous plants, with scaly bark and reddish-brown heartwood enclosed by a thin, white layer of sapwood. The branches are spreading, always giving the

plant an ornamental form, and the leaves, though much reduced like those of all pines, are not evergreen. The flower buds, which form one year and bloom the next, develop into two kinds of flowers—the staminate, or stamen-bearing, that hang in long, drooping clusters, and the pistillate or fruit-producing, that become globular, short-stemmed cones.

The bald cypress, which grows in southeastern United States, is one of the handsomest and most valuable of American trees. It often grows to a height of 150 ft., with a large cylindrical trunk that spreads at the base. In wet localities, or when growing in standing water, its roots send up conical projections, called "knees," whose function is not fully known. The wood is very durable and is used for cabinetwork and general outdoor construction, since it is practically immune from attacks of parasites and of the weather.

Cyprus, *Sī prus*, an island in the Mediterranean Sea, one of the most easterly and one of the most important. It is 46 m. s. of Asia Minor and about 50 m. w. of Syria; it is 145 m. long, 60 m. wide and has an area of 3584 sq. m. Two mountain ranges cross its surface and the name Mt. Olympus was once applied to a particular peak. Mt. Troodos, the highest summit, is 6500 ft. in height. Mt. Olympus has a heavy covering of pine woods. Deficient rainfall kept agriculture in a backward state until about 1878, when the island came into the control of the British. Since that date adequate means of irrigation have been established. The ancient supplies of copper, silver and precious stones are exhausted. The word *copper* is derived from the name Cyprus. Salt, gypsum and terra umbra are mined. The principal vegetable products are barley, oats, wheat, grapes, cotton and olives. There are few good harbors and commerce is insignificant. The chief towns are Lefkosia, Famagosta, Limasol, Larnaka and Baffo. Lefkosia, or Nicosia, is the capital. The history of the island can be traced back to the Bronze Age. It passed into the hands of the Phoenicians, Egyptians, Grecians,

Persians, Turks and other peoples. Cyprus is governed under a constitution given it by Great Britain, and in recent years the people have made rapid advancement in prosperity. Population in 1901, 237,022.

Cyrenaics. See ARISTIPPUS.

Cyrus, *Sī rus*, the Great (about 600-529 B. C.), a prince of Persia. While a young man, he overthrew the Median power, and his rapid military success drew upon him the jealousy of the other rulers. A coalition of Babylonia, Egypt, Lydia and Sparta was formed against him. The attack was begun by Cræsus of Lydia in the spring of 546 B. C., and the Lydian ruler was defeated. In 539 Cyrus overcame the Babylonians under Nabonidus, and the city of Babylon soon fell without resistance. Thus the Babylonian provinces of Syria came under the Persian rule. In 538 B. C. Cyrus permitted the Jews, exiled by Nebuchadnezzar, to return to Jerusalem and to rebuild the city and its Temple. In 530, leaving his son Cambyes in charge of the government, he set out on an expedition against the East and was killed in 529 B. C.

Cyrus the Younger (about 424-401 B. C.), younger brother of Artaxerxes, King of Persia. After his father's death Cyrus plotted against his brother, was condemned to die but was released at the intercession of his mother and sent to rule in Asia Minor. Here Cyrus gathered an army which was increased by 10,000 hired Greeks, and set out to dethrone his brother. Artaxerxes met him at Cunaxa (401 B. C.), where the troops of Cyrus gained a fruitless victory, for Cyrus was killed. The 10,000 Greeks were left to make their way to the coast as best they could. How this was done is told in a graphic way by Xenophon, a young Athenian of the Greek army. See XENOPHON.

Czecho-Slovakia, *Čech'o Slō vak' e ah*. A republic of Europe that came into existence as one of the results of the World War of 1914. It is a long, narrow stretch of country, extending from the western extremity of Bohemia

to the confines of Bukowina, a distance of 600 miles in a slightly southeastern direction; but has an average width of about 90 miles, only, so that its area is 54,413 sq. mi. Its population is 13,595,816, according to a census taken in 1921.

ETHNOLOGY. In accordance with the principle of ethnic determination adopted by the Peace Congress at Paris in 1919 for the purpose of nationality, Czecho-Slovakia includes sections of the old Austria-Hungarian empire in which the people are closely related branches of the Western Slavs. The Czechs of the old Bohemian Kingdom of Bohemia, Moravia, and Austrian Silesia are only dialectically different from their Slovak brethren of Slovakia. This latter province was the highland section of Hungary lying south of the Carpathian Mountains extending from Silesia to the old province of Bukowina. Its southern boundary is not well defined but is determined by the irregular, curving courses of the River Gran and the upper tributaries of the Theiss rivers in general terms marking the northern extremity of the Hungarian plains.

SURFACE FEATURES. The Western provinces of the republic consist of elevated plateau sections ringed round by mountains (see **BOHEMIA** and **MORAVIA**). The long range of the Carpathians forms the back wall or rampart of Slovakia and dominates the surface features of that province, sending out minor ranges towards the plains of Hungary. Some of the grandest scenery in Europe is in the High Tatra section of Slovakia. In general terms, the country reminds one of the broken, hilly sections along the Alleghenies in the United States.

AGRICULTURE. In general the plateau sections of the west provinces are fertile and all the usual cereal crops of the temperate zone are raised. But, excepting the southern sections of Slovakia, near the plains of Hungary and near Pressburg, the soil of the eastern province is not fertile enough to support the farmer in independence. The land unfit for cultivation averages fifteen per

cent throughout, a characteristic feature of the country is the multitude of small farms,—from one to five acres, and only a part of that is arable. Sheep farming is carried on extensively. Livestock raising is also general.

INDUSTRIAL LIFE. The republic possesses great industrial possibilities. Water power, especially in Slovakia, is abundant. This combined with extensive forests and coal and mineral wealth will advance the republic to the front ranks of manufacturing nations in Europe.

HISTORY. While the republic is in its infancy, the Czechs in the west, and the Slovaks in the east have a most interesting history though the beginning of that history is lost in antiquity. When the desolating tide of the Hun invasion rolled in on Europe, Slavic people, of which the Czechs and Slovaks are branches, held the mastery in Europe from the Alps to the mouth of the Elbe, from the Baltic to the Black Sea. When that tide receded lines of cleavage had formed and we find the Czechs and Slovaks occupying their present sections. From those sections they have never been dislodged though they were for recent centuries oppressed by Austria and Hungary and had to summon all their energies to retain their language and national ideals. After a confused period of tribal activity we come to the establishment of the Premysl dynasty in Bohemia and under the rules of these kings the Czechs achieved great standing and influence, ruling at times over a large part of Austria and even, though briefly, over Hungary. In the latter part of the thirteenth century Bohemia ruled from Saxony to the Adriatic. Vienna was called their second capital. In 1348 their king was elected Emperor of Rome and Bohemia was said to be first in the world in power, wealth, progress and liberty.

In Austrian history (see **AUSTRIA-HUNGARY**) we read of the disastrous alliance Bohemia formed with Austria and Hungary in 1526. From that date to the conclusion of the World War the Czechs were oppressed by Austria. The Slovaks suffered even more under Magyar rule.

D

DACE, a river fish of the Carp Family. It is found in little brooks with the minnow and shiner, and, though a good game fish, has little value except to add to the count on the string. The dace may be identified by its plump, graceful body and pointed head. In eastern United States the horned dace, usually known simply as the dace, have well-developed horns during the breeding season.

The shiner, or red dace, found from New England to Kansas, is a small species seen in large schools near the shores of almost all clear lakes and ponds of northern United States.

Daddy Longlegs, or Harvestman, a family of Arachnida, related to the spiders. In the United States where they are very common, they are frequently known as grandfather graybeards, probably because of their slow movements and the gray color of their bodies. The commonest species have exceedingly long, slender legs, although their bodies are not raised high above the ground; instead, the legs are raised at the mid-portion in such a manner that they are like a slender trellis, with the body set near the ground in the center. The short, broad abdomen is made up of six segments, but has no tail. The head and thorax are united in one section, known as the cephalothorax, and on this are borne two stalked eyes. Since the daddy longlegs devour their prey instead of merely sucking its blood as do the spiders, their mouths are larger and they have better developed jaws. The daddy longlegs do not spin webs, but live in burrows and are harmless to man. In England the name daddy longlegs is applied to the crane fly.

Dædalus, Ded' a lus, a mythical Athenian skilled in architecture and statuary. Having killed his inventive nephew, Perdix, through jealousy, he fled to King

Minos of Crete, for whom he built the labyrinth. Later he incurred the monarch's anger. For this he was locked in a tower, from which he and his young son, Icarus, effected their escape by sets of feather wings that he had fashioned. Icarus flew so close to the sun that the wax on his wings melted and he fell to his death in the sea. Dædalus, however, landed safely in Sicily, where he built a temple to Apollo and dedicated to him his wings.

Daf'fodil, or False Narcissus, a garden or house plant of the Amaryllis Family. Its leaves and flowers rise from a bulb. The leaves are flat and stemless, like those of the rushes. The flower stems are cylindrical and somewhat hollow. The flowers are tubular but the margin is turned back and wavy. Their color is bright yellow. Double varieties are found in gardens. The jonquil, with which this is often confused, has more narrow, sometimes partly cylindrical, leaves and shorter flowers, with a delicate fragrance.

Da'foe, John Wesley (1866-), a Canadian journalist, born in Ontario. In 1883 he joined the *Montreal Star*, being its Parliamentary correspondent. In 1885 he became editor of the *Journal*, Ottawa, but the following year joined the staff of the *Manitoba Free Press*, where he continued until 1892. Subsequently he was editor-in-chief of the *Montreal Daily Herald* and on the editorial staff of the *Montreal Star*, where for six years he edited its weekly edition. Since 1901, he has been editor-in-chief of the *Manitoba Free Press*, a position he has filled with distinguished success.

Daguerre, Da" gair', Louis Jacques Mandé (1789-1851), a French painter and physicist, inventor of the daguerreotype. He was born at Cormeilles, where he first painted scenery for the opera and later, panoramic views. His chief right

to fame rests upon his invention, with the assistance of J. Nicéphore Niepce, of a process of photography which produced the daguerreotype. For this service to science Daguerre was appointed an officer of the Legion of Honor and allowed an annuity of 6000 francs by the French Government. See PHOTOGRAPHY.

Daguerreotype, *Da ger' o tipe*. See PHOTOGRAPHY.

Dahl'gren, John Adolph (1809-1870), an American naval officer and inventor, born in Philadelphia. He entered the navy, became midshipman in 1826, and in 1834 began to serve on the coast survey. In Washington, while on ordnance duty, he became interested in inventions, and in 1850 devised the Dahlgren gun, which is still in general use and unsurpassed. Because of its shape it is commonly known as the "soda water bottle." He took active part in the Civil War, in 1863 being rear-admiral of the South Atlantic Blockading Squadron, and afterwards assisting General Sherman in South Carolina and Georgia. In 1866 he was given command of the South Pacific Squadron, and two years later took charge of the bureau of ordnance in Washington. Among his writings are *Percussion System, Shells and Shell-guns, Boat Armament and Maritime International Laws*.

Dahlia, *Dahl' ya*, a coarse, hardy garden plant of the Composite Family. The plant rises from lengthened, tuberous roots and has straight, leafy stems growing sometimes to a height of seven or eight feet. The leaves are made up of little, rounding leaflets, which are opposite each other on the midrib of the leaf. Their margins are finely cut. The flowers, which are really heads of flowers surrounded by bright-colored rays, may be single or very double. The flowers themselves, in cultivated species, have mostly become rays. There are many varieties known in cultivation, because the showy heads of blossoms of all colors make this a favorite dooryard plant.

The principal species of cultivated dahlias are: the cactus dahlia, which is double and has long, twisted petals; the

decorative dahlias, which have large flowers with flat petals; the show dahlias, which are more compact and ball-shaped; and the single dahlias. Dahlia blossoms are principally in shades of red, yellow or white in color, and in size may be from two to eight inches across.

Dahomey, *Dah ho' may*, a French possession of western Africa lying between Togoland on the w. and Nigeria, Lagos and Yoruba on the e. In the north the country is mountainous and has vast forests of palm and baobab. The coast region, which has an extent of 70 m. on the Gulf of Guinea, is fertile and intersected by so many channels as to make it almost like a group of many small islands. Here there are large cultivated tracts where Indian corn, cotton, yams, manioc-root and a variety of fruits, chiefly figs, tamarinds, cashews, kolans and coconuts, are raised.

The natives of Dahomey were formerly a superstitious people, ruled by a despotic sovereign to whom they rendered implicit obedience. In times of war they were fierce and treacherous and in times of peace were capable of great massacres for religious ceremonies. Under the French rule, which has existed since 1900, the Dahomans have seemed to be a peaceable race devoted to agriculture and to the manufacture of pottery. The chief cities are Abomey and Porto Novo, the capital. In area Dahomey comprises about 42,000 sq. m., and its population is estimated at 851,400.

Dairy Husbandry, the branch of agriculture which deals with the production of milk and the manufacture of cheese and butter. Denmark and France have been the foremost dairy countries of the Old World, and the United States is the leading country in the world in the industry. New York, Pennsylvania, Illinois, Iowa and Wisconsin are the states principally engaged in dairy husbandry. At present there are nearly 22,000,000 milch cows in the country producing annually about 11 billion gallons of milk. The favorite dairy breeds of cattle are the Jersey, Holstein, Guernsey, Short-horn and Durhams, although on the small

AGRICULTURAL GOLD MINES



PRIZE RED POLLED COW



A USEFUL CITIZEN

This Jersey cow produced 69.8 pounds of milk in one day.

THE NEW AGRICULTURE



MODERN DAIRY BARN—EXTERIOR



MODERN DAIRY BARN—STABLE

Delicious milk comes from dairies where cleanliness and ventilation are the rule.

dairy farms mixed breeds are more common. The annual output of butter is about 1,620,000 lb., and of cheese, a little over 320,500,000 lb. About 500,000,000 lb. of condensed milk are manufactured. The total value of the dairy products of the country is about \$275,000,000.

The modern dairy farmer pays especial attention to the health and cleanliness of his cows and the cleanliness of his buildings and dishes. Tests are continually being made of the amount of milk and the richness of the milk produced; also of the feed best fitted for making rich milk. Modern dairy farms are generally equipped with clean, well-arranged barns, supplied with running water for flushing the floors, milking machines, milk rooms where the milk is cooled and bottled, creameries where butter is made and frequently with cheese factories as well. It has been found on the best farms that if cows are fed during the dry months with feed other than the pasturage, the quality of the milk is more constant; alfalfa hay is an excellent supplementary feed.

Dairying is carried on in all parts of the United States and is one of the most profitable industries. See CREAMERY; BUTTER; ENSILAGE; CHEESE; SILO; CATTLE.

Daisy, *Da' zy*, a name given to a great number of plants of the Composite Family and also to a few daisylike plants of other families. There are at least 25 species known in this hemisphere, two of which are natives of the United States. The true daisy (*bellis perennis*) is a low herb with undivided or cut-margined leaves. The blossom is a flattened head of yellow flowers surrounded by white, purple or crimson-tipped rays. It has been variously called English, European, dicky, or dog, daisy, and also marguerite in France and gowan in Scotland.

The most common daisy is a member of an allied genus, the chrysanthemum. This daisy spreads so rapidly that it has become a great pest to farmers. It blooms all through the spring and summer and colors meadows and fields with white and gold. The flowers, which are heads

with yellow centers and white rays, have long, leafy stems and much-divided leaves. This daisy also has a variety of names: whiteweed, ox-eye daisy, great daisy, poor-land daisy, white daisy, farmer's pest, marguerite, etc. It is the state flower of Tennessee.

Other so-called daisies are the tall buttercup of the Crowfoot, or Buttercup, Family, and the sea daisy, or marsh rosemary, of the Leadwort Family. Daisies take readily to cultivation and are exceedingly good for decoration from their artistic simplicity of form and their good lasting qualities. The Shasta daisy is a semidouble, greenhouse variety produced by Burbank.

Dako'ta, or **James, River**, a river of the Western plains rising in Wells County in North Dakota and flowing almost directly south across North and South Dakota until it joins the Missouri a few miles east of Yankton. It is about 500 m. in length, and the cities of Jamestown, N. D., and Huron and Redfield, S. D., lie upon its banks.

Dale, **Sir Thomas** (?-1619), a colonial governor of Virginia. In 1606 he was knighted for his service in the English army. In 1611 he took men and supplies to Virginia, where, succeeding Lord Delaware as governor, he enforced the "Dale Code" during a period known as the "five years of slavery." Nevertheless, it was by abolishing communism, by compelling labor, by forbidding tobacco crops for those more necessary, and by frequently hanging evil-doers that Dale transformed a disorderly colony into a thriving settlement. Besides, by fairness, he won the Indians' regard.

Dall'as, **George Miffin** (1792-1864), an American statesman, born in Philadelphia, son of Alexander J. Dallas. He graduated from Princeton in 1810, was admitted to the bar in 1813, became mayor of Philadelphia in 1828, United States district attorney in 1829 and United States senator in 1831. In 1837 he was appointed minister to Russia. He was elected vice-president of the United States in 1844 on the ticket with James K. Polk. In 1856 he became minister

to England, and in that capacity displayed a high order of diplomatic ability.

Dallas, Tex., a city and the county seat of Dallas Co., about 280 m. n.w. of Galveston, at the head of navigation on the Trinity River, and served by nine railroads: the Texas & Pacific, the Missouri, Kansas & Texas, the Chicago, Rock Island & Pacific, the Houston & Texas Central, the St. Louis & Southwestern, the Texas & Brazos Valley, the Cotton Belt and the Gulf, Colorado & Santa Fe. There are four interurban electric lines out of the city operating 136 daily trains: the Texas Traction, the Southern Texas Traction, the Northern Texas Traction and the Eastern Texas Traction companies. The city is one of the largest wholesale and manufacturing centers of the Southwest, and is situated in the heart of the famous black waxy land belt, where abundant crops of cotton, corn, wheat, oats, fruits and vegetables are grown.

PARKS AND BOULEVARDS. The city has an excellent system of beautiful parks, boulevards and drives. Fair Park, the principal pleasure resort, has 137 acres and is owned and controlled by the people of Dallas. The Texas State Fair meets here annually, and it is one of the largest and most successful permanent institutions of its kind in the world, attended annually by over 600,000 visitors. It has a coliseum seating 7500, and other permanent buildings valued at approximately \$2,000,000. Other parks are Forest Park, which has extensive zoological gardens, City Park, Oak Lawn, and Central, Turner, Plaza, Monument and Maple Avenue parks. There are also a number of well-equipped playgrounds. There are altogether 3500 acres of parks and playgrounds and 160 m. of splendidly paved streets and boulevards.

PUBLIC BUILDINGS. The noteworthy buildings include the Dallas County Courthouse, Federal Building, city hall, Union Station recently constructed, costing \$6,300,000, a Carnegie library, Scottish Rite Cathedral, Adolphus Hotel, which cost \$1,600,000, the Y. M. C. A., Chamber of Commerce and the Dallas

Golf and Country clubs. There are 119 churches in the city, and 76 schools, colleges and universities; many social and fraternal organizations maintain headquarters with splendid buildings and equipment.

INSTITUTIONS. The principal educational institutions are the Southern Methodist University, Dallas University, Baylor Medical and Pharmaceutical College, St. Mary's College, Ursuline Academy, Terrel School for Boys, St. Edward's College, Patten's Seminary, St. Joseph's Academy, Hardin's School for Boys, and several business colleges. The public school system is excellent with well equipped buildings and modern courses. Among the benevolent institutions are Buckner's Orphans' Home, St. Matthew's Home for Aged Women, and three settlement homes conducted by various churches of the city.

INDUSTRIES. Dallas serves an extensive trade territory and is one of the largest manufacturing centers in the United States for leather goods, saddlery and harness, and cotton-gin machinery; it is among the leading cities in the sale of agricultural implements and machinery. The industrial interests include the shipping of live stock, fruits and agricultural products. There are large slaughter and meat-packing establishments, flour mills, gristmills, cotton-compress works, lumberyards, cooperage works and manufactories of electrical machinery, jewelry, furniture, paints and oils, dental and surgical instruments, and cottonseed products.

HISTORY. The first settlement was made in Dallas in the fall of 1841 by a pioneer from Tennessee named John Neeley Bryan. It was named in honor of George Mifflin Dallas, vice-president of the United States from 1845 to 1849. The first city charter was granted in 1856. In 1875 the first railroad entered the city. Dallas was one of the first cities to adopt the commission form of government, and under the charter of 1907, which includes the initiative, referendum and recall, it has had a progressive and successful administration. Population in 1920, 158,976.

Dalmatia, *Dal ma' che ah*. The littoral fringe of the east shore of the Adriatic, extending south from Fiume to Antivari, situated between the Dinaric Alps and the sea. Its width is nowhere more than thirty-five miles and for much of the distance considerably less. It was formerly a crown land of Austria with an area of 4956 sq. m. That small fringe of mainland with the numerous islands along its shore is of historic, ethnic, and political importance.

Historically it takes us back to Roman days. At Spalato are the still impressive ruins of Dioclesian's palace built early in the 4th century. Three centuries later, the great Slavic invasion of Europe submerged the Latinized people of Dalmatia and it became a part of Croatia. In the days of the City Republics, Dalmatia was subject to the rule of Venice. The possession of Dalmatia was desired by Venice because of its proximity and its strategic importance—commanding the approaches to Venice,—in addition, considerable part of the population, especially in the cities, is Italian in ethnology.

As the power of Venice declined, other nations made determined efforts to secure this strategically important littoral fringe, with its scenic charms, its indented coast, and its pleasing climate; and so it passed back and forth, now Venice, then Hungary, at last Austria, in whose possession it was given by the treaty of Campo Firma in 1794. It remained a crownland until 1918.

Dal'ton, Ga., a city and the county seat of Whitfield Co., 114 m. n.w. of Atlanta, on the Southern, the Western & Atlantic and other railroads. Situated in the Cotton Belt, it has an extensive trade in this commodity. Grain and fruits also are grown in the neighboring district. The city has rich mineral resources, iron, manganese and limestone occurring in valuable quantities. Among the industrial works are foundries, machine shops, cotton and lumber mills and manufactories of agricultural implements. Dalton was settled in 1848 and was incorporated in the same year. In the Civil War Dalton was the scene of

several minor engagements. Population in 1920, U. S. Census, 5,282.

Dalton, John (1766-1844), an English chemist and physicist, whose knowledge of these subjects was derived almost entirely from his own experimental work. He graduated from no school, but became a "public and private teacher of mathematics and chemistry." His best-known work is the statement and exposition of the atomic theory, which came as a result of his study of the physical properties of the air. From this theory he stated the chemists' law of multiple proportions, and the theories which he evolved are still accepted. His work has been of great consequence in the realm of theoretical chemistry.

Dam, a work constructed across a stream for the purpose of obstructing the current and raising the level of the water. Dams are constructed for two purposes, securing water power and impounding water for irrigation.

Dams vary in construction according to the difficulties to be surmounted. Large and important dams are, almost of necessity constructed of stone and concrete. An example of such a dam is the Keokuk Dam across the Mississippi. But one of the largest and most important dams in the world—Gatun Dam in Panama—is constructed entirely of earth material dumped across the valley of the Chagris River. Some dams, built by the government to improve navigation of some rivers, are peculiar in that the dam proper can be laid flat on the bed of the stream when the river is at flood stage.

The most peculiar type of dams in the world is the emergency dams at the locks of the Panama Canal. At present they are mounted on turnable devices on the shore parallel to the locks. They can be swung in position and lowered into place in a few moments. See IRRIGATION.

Dam'ages, in law, compensation allowed a person for loss or injury sustained through the fault of another. Damages are of two classes; those allowed for direct pecuniary loss, such as the flooding of land by damming a stream, and those allowed for bodily injury or injury

to one's feelings, such as injuries through railway accidents, slander and breach of promise. In damages of the first class, the courts usually allow damages equivalent to the actual pecuniary loss sustained and the cost of the suit; in those of the second class there seems to be no general rule. The personal relations of the plaintiff and defendant, the nature of the injury and other personal elements enter into the award. In most states of the United States employers are liable for injuries to employees, unless the employee is wholly to blame for the injury. Common carriers are liable for injuries to passengers caused by wrecks or carelessness of employees. It is not necessary that the act be criminal or fraudulent that damages arising from it may be collected.

Damascus, *Da mas' kus*, one of the most ancient cities of the world, the former capital of the Kingdom of Syria. It is situated at the foot of a range of hills and on a plain which is about 2200 ft. above sea level, and is a three days' journey from the Sea of Tiberias, lying to the southwest. It is connected with Beirut, 53 m. to the northwest, by a railroad. The River Barada, passing along the north boundary of the old portion of the city, furnishes a copious supply of water, making possible many pleasant gardens, orchards, fountains and baths. The streets are for the most part narrow, crooked and dirty; the principal street, one of the straightest, is regarded as "the street which is called Straight" of *Acts ix, 11*, where Paul sojourned shortly after his conversion.

Among the more interesting public buildings are the eastern gate, exhibiting some remains of Roman architecture, a large castle dating from the Roman period, the great Mosque of the Omniads and the many smaller mosques throughout the city. In a particular quarter of Damascus are the many and varied bazaars, separated according to their respective wares, and usually having the form of covered arcades with a row of narrow shops on each side. Goods are imported from the East and from Eu-

rope. Silk, damasks, cotton and other fabrics, gold and silver thread, perfumes, delicate oils, soap and other articles are manufactured. The origin of Damascus is lost in antiquity, but about 1000 years after the time of Abraham it appears as an important Syrian city.

The history of Damascus connects with that of all great people of antiquity. It was a part of the great Assyrian Empire of Sargon I. Nearly 4000 B. C. it paid tribute to the Hittites and acknowledged the sway of the Pharaohs. It was a city of Alexander's empire, was ruled by Rome, and afterwards governed by the Caliphs. In 1618 it passed under the control of Turkey, and suffered from the paralysis of Turkish misrule for three centuries, then British troops occupied the city and a new age dawned for Damascus. Population, mostly Turkish, is estimated at about 154,000.

Damien, *Da myan'*, **Father**, the name of **Joseph de Veuster** (1840-1889), a Roman Catholic missionary, born in Tremeloo, Belgium. When he was 19 years old he became a priest and in 1864 was sent on a mission to Honolulu. The condition of the lepers on the Island of Molokai attracted his attention, and in 1873 he removed to their midst to act as their physician and teacher. He also looked after material wants, such as water supply, food and the condition of their dwellings. In 1885 he fell prey to their fatal disease, but continued to labor among them until his death.

Damocles, *Dam' o klez*, a courtier of the elder Dionysius, tyrant of Syracuse. It is recorded by Cicero that Damocles praised the lot of Dionysius as the happiest fate on earth, whereupon the Emperor, as a subtle reproof, suggested that his sycophant enjoy the grandeurs of royalty for a few days. In accordance with this plan, Damocles was shortly dining at the royal board, when, to his horror, on glancing upward, he saw above his head a keen-edged sword suspended by a single horsehair. This alarming spectacle made him alter his opinion regarding the happiness of monarchs.

Da'mon and Pyth'ias, two Pythagoreans of Syracuse, famous for their friendship. Pythias, having been unjustly condemned to death by Dionysius of Syracuse, was permitted to go home to see his family before his execution, and Damon pledged his own life for his friend's return. Great rains caused a rising of the river and Pythias was delayed, but came back at the last moment, in time to save Damon. This additional proof of complete devotion so moved Dionysius that he pardoned Pythias and asked to be admitted to their friendship. The fraternal order of Knights of Pythias is based on this incident. See **KNIGHTS OF PYTHIAS**.

Damrosch, *Dam' rosh*, **Leopold** (1832-1885), an American musician, born at Posen, Prussia. He graduated in medicine at the University of Berlin and practiced at Posen. Later he studied music and became a concert violinist and afterwards director of orchestra in Posen and Breslau. In 1871 he removed to New York, where he was the first to introduce and maintain German opera and establish choral societies.

Damrosch, **Walter Johannes** (1862-), an American composer, conductor and lecturer, born in Breslau, Prussia, the son of a distinguished musician, Dr. Leopold Damrosch. He has done much to popularize German opera in America, and has introduced to American audiences some of the greatest European singers and foreign compositions. He lives in New York, and is conductor of the New York Symphony Orchestra.

Dam'son, a name given to several varieties of plums, members of the Rose Family, which horticulturists have made the basis of their improved species of the fruit. In a wild state the fruit is small, oval and not particularly juicy but of pleasing flavor. The tree took readily to cultivation, however, and by judicious grafting, cross-fertilization and care has been made to produce exceptionally fine fruit. Damson plums may be found in blue, yellow, red or purple varieties and large or small sizes, but the flavor is always pleasing.

Dan, the name of a son of Jacob by Bilhah. The name means judgment, and it was said of him, "Dan shall judge his people, as one of the tribes of Israel." The tribe of Dan was second in number of members at the time of the departure from the wilderness, and to it was assigned the coastal region of the Promised Land between Ephraim on the north and Simeon on the south. Samson was the most notable member of the tribe.

Dan, a city of Canaan and one of the most northerly of the Promised Land. It was chosen by Jeroboam as one of the centers of his idolatrous worship, and continued corrupt until the time of its destruction. No trace of it has been found in modern times. The second syllable of the word Jordan is said to have been derived from the name of this city.

Da'na, **Charles Anderson** (1819-1897), an American journalist, born in Hinsdale, N. H. He studied at Harvard for two years, was a member of the Brook Farm Community for the same length of time, and in 1847 joined the staff of the *New York Tribune*, of which he became managing editor in 1849. In 1863-65 he was assistant secretary of war and rendered the country valuable service. In 1868 he became part owner and editor of the *New York Sun*, where by his editorials he helped to shape American politics for several years, and won the distinction of being one of the great editors of the country. He translated *The Black Ant*, edited the *Household Book of Poetry*, was the compiler of *Fifty Perfect Poems* and wrote the *Life of Ulysses S. Grant* and the *Art of Newspaper Making*. Together with George Ripley he edited the *New American Cyclopædia*.

Dana, **James Dwight** (1813-1895), an eminent American geologist, born in Utica, N. Y. After graduating at Yale in 1833, he was appointed teacher of mathematics in the United States Naval Academy. He was made United States geologist and mineralogist in 1836, and assisted in an extensive exploring expedition in the Southern and Pacific oceans. From 1855 to 1890 he was pro-

fessor of natural history at Yale. The London Geological Society awarded him the Wollaston medal in 1872, and the Copley medal was given to him by the Royal Society of London in 1877. He had an extraordinary capacity for work, undertaking in his 82nd year the revision of his *Manual of Geology*. Aside from his reports on *Zoöphytes*, *The Geology of the Pacific and Crustacea*, he wrote *A System of Mineralogy*, *Corals and Coral Islands*, *Text-Book of Geology*, *Manual of Geology* and *Characteristics of Volcanoes*.

Dana, Richard Henry, Jr. (1815-1882), an American author and lawyer, born in Cambridge, Mass. He was the son of Richard Henry Dana, the poet and critic. Because of failing eyesight he left Harvard before he had completed his course, and undertook a sea voyage to California by way of Cape Horn. As a result of his experiences he wrote his most noted book, *Two Years Before the Mast*. He returned to graduate at Harvard in 1837 and was admitted to the bar in 1840. After a trip around the world in 1859-60 he held some minor political offices and practiced law; but gave up his practice in 1878 and devoted the rest of his life to study and travel. He contributed to the *North American Review*, wrote *The Seaman's Friend*, *Memoirs of Edward Channing* and *Memoirs of Washington Allston*.

Dan'bury, Conn., a city and one of the county seats of Fairfield Co., 60 m. n.e. of New York City, on two divisions of the New York, New Haven & Hartford Railroad. Hat making, which was begun here in 1780, has grown to such proportions that Danbury is now the greatest hat-making city in the United States. There are also extensive manufacturing of brass, iron and silver-plated ware, bicycles, paper, wooden boxes, shirts and hat- and fur-cutting machines. A state normal school is located here. A public library and a number of soldiers' monuments, one to General Wooster, are included in the noteworthy features of the city. Supplies were stored here during the Revolution, and in April, 1777,

General Tryon destroyed the stores and burned many buildings. Danbury was incorporated as a borough in 1822, and chartered as a city in 1889. Population in 1920, 18,943.

Dancing, a series of movements and measured steps, in time with music; now commonly only a form of exercise and amusement or of entertainment for others; but in ancient times, and even today among primitive peoples, very generally a religious rite. Dancing is the natural outcome of a universal desire to express emotions by action; and, when not distorted into such debasing forms as sometimes flourish, tends to develop that complete and harmonious control of the body which is one of the highest aims of all intelligent physical training. On this account, the more simple folk dances of many races now very commonly form a part of the school training of both sexes; while in our largest cities, school halls, and others which can be wisely and effectively supervised, have been thrown open to the public in order that those who wish to dance, but have no opportunity in their own homes, may find it unnecessary to frequent places where the management may be at least questionable, if not vicious.

Folk dances include three general groups—the *social*, *warlike* and *religious*. Among savages the utmost exactness of movement is insisted upon; for with them it is serious business. This was true among the American Indians, who practiced various ferocious war dances in which they wrought themselves up to a state of frenzy. Among such peoples, the men and women usually dance separately; and, not infrequently, the women perform religious dances when the men are supposed to be in danger on some important expedition. The idea of magic is intimately associated with the dances of many primitive peoples; as, in the buffalo dances of the Mandan Indians, which were supposed to bring much-needed game; and in the mystic dance of Central Africa, designed to bring rain. The Zulu war dance, like the Pyrrhic dance of the ancient Spartans, is consid-

ered a noble exercise for warriors; while the whirling Dervishes of the East at least command respect for devoutness and piety when they work themselves into spasms of emotional excitement.

In the development of the modern dances of civilized society, France has taken the lead. These include: the *minuet*; the *quadrille*; the *galop*, introduced from Germany; the *cotillion*, fashionable in the time of Charles X; the *lancers*, introduced about 1836 by Laborde; the *polka* brought from Prague in 1840; and the *schottish*, also from Bohemia, introduced among Parisians in 1844. The *waltz* originated in Bavaria, but in modified form has been generally adopted, as has the American two-step.



DANDELION

At May-day celebrations and similar fêtes, the characteristic dances of various races or classes of people are a prominent feature. These include such dances as the Irish *jig*, the negro *break-downs*, the sailors' *hornpipes*, the Scotch *reel* and *Highland fling*.

Dan'delion, a well-known member of the Composite Family. The common dandelion is a low, stemless herb whose long leaves form a close circle on the ground about the flower stems. These leaves, which are narrow and roughly cut, are used for greens and salads in the spring. The flower stems are hollow,

have a milky juice and bear the brilliant yellow flowers crowded close in a flattened head surrounded by small green leaflets called bracts. As the seeds ripen, each has upon it a little tufted parachute of feathery hairs, forming the white ball so familiarly known. Because of the number of the seeds and the ease with which they are scattered, the bitter juice which protects the plant from cattle, and the lowness of the plant, it is very widespread. In the illustration 1 represents the leaf; 2, the flowerstalk and flower cluster; 3, the single flower; and 4, the ripened seed, with the pappus attached.

Cynthia, or dwarf dandelion, is a smaller species with somewhat leafy stems and smoother leaves. The false dandelion is the tallest species, often growing to a height of two feet. Its branching, leafy stems bear less broadly spread flowers of a paler yellow shade. Many of the species are used in medicine.

Dan'die Din'mont, a small terrier with a long body, short legs and a coat of long hair which is of speckled black, white and tan. The head is large, the ears long, silky and drooping and the nose is broad and dark. This dog is a great pet in Scotland; one of the species was Sir Walter Scott's favorite dog, and he has celebrated it in literature in his tale *Guy Mannering*.

Daniel, *Dan' yel*, a book of the Old Testament following *Ezekiel* and preceding *Hosea*; also the name of the chief character of the book. The date and authorship of *Daniel* have been a matter of much dispute. The old theory is that the book was written by Daniel several centuries before Christ; modern scholars attribute the authorship to a Jewish patriot, writing about B. C. 165, for the purpose of encouraging the Jews, then oppressed by Antiochus IV. According to the Scriptural narrative, Daniel was one of the princes of the royal family of Judah. Carried captive to Babylon in his youth, he was educated in the court of King Nebuchadnezzar. He first came into notice when he interpreted Nebuchadnezzar's dream, 603 B. C. Later he acted as viceroy during the period of the King's

madness, and in the reign of Belshazzar interpreted for that monarch the handwriting on the wall that foretold his downfall. Daniel was promoted to the highest government position by Darius and also served in this capacity under Cyrus. The book of *Daniel* consists of narratives and prophetic visions. See BIBLE, subhead *The Old Testament*.

Daniell Battery. See ELECTRIC BATTERY.

Dante, Dan' ta, Alighieri (1265-1321), an Italian poet, born in Florence. He is unquestionably Italy's greatest poet, as well as among the greatest of all times. Although he could trace his descent from an ancient family of note, his claims to noble blood have not been verified. Of his boyhood nothing is known, except that his mother died in his early childhood, and that the famous Florentine, Brunetto Latini, was his teacher. When nine years old he met the Beatrice (now identified as Beatrice Portinari) for whom, throughout his life, he cherished a permanent and passionate affection and whose name, as a symbol of perfection, he made memorable by his exquisitely intense and tender song. This Beatrice died in 1290, and his poem celebrating her beauty and spirituality, the *Vita Nuova*, or *New Life*, was the earliest of his important works.

At 25 Dante became a soldier, and in 1300 he was elected one of the six priors of Florence. From that time he dated the beginning of his misfortunes. During the struggle between the Guelphs and the Ghibellines he allied himself with that faction of the former known as the Bianchi, as opposed to the Neri. On his temporary absence to Rome his enemies seized and pillaged his home and property and condemned him, with his friends, to exile. Provisions for burning him alive, if he was captured, were also made. Then began his years of wandering from one court of Italy to another and his bitter dependence on others. In 1315 Florence further humiliated him by offering him permission to return on conditions which he was forced scornfully to reject. He finally took refuge

with his noble patron, Guido da Polenta, Lord of Ravenna, where his last years were engaged in the completion and retouching of his great epic, the *Divine Comedy*. An exile for 19 years, he died at Ravenna, and those who had most firmly denied him the rights of citizenship in Florence now became the most ardent in bewailing his death. For two centuries Florence tried in vain to recover his remains, but they were hidden, for fear of theft, and their secret resting place was not disclosed until 1865.

Dante's chief works are *Vita Nuova*, or *New Life*, *The Banquet* and the *Divine Comedy*. The *Vita Nuova*, a combination of prose and verse, is one of the earliest polished prose works of Italian literature. Revealing, as it does, undying love for the gentle Beatrice, it is pervaded by noble sentiment, unearthly spirituality and poetic charm. The *Divine Comedy*, his masterpiece, is an allegorical epic wherein the poet, guided by reason and revelation, depicts his vision of hell, purgatory, paradise, the several heavens and finally of God himself. The meaning is symbolical: Mankind seeking alike temporal and eternal happiness. He discusses many of the vital points of medieval philosophy, attacks the corruptions in Church and State and with a strain of mysticism expresses the beliefs and aspirations of the Middle Ages.

Dante was too much the "seer" and too fully a representative of that great era of mankind which he chose to interpret, to be fully comprehended by his age, and even now after the passing of centuries, the world hesitates to claim an intimate knowledge of his true greatness. He is frequently compared with Milton, but Milton records a history, and does not, like Dante, attempt a revelation. Milton's verse is magnificent, sublime; Dante's is minute, sweet and beautiful. The *Divine Comedy* and *Paradise Lost* are frequently contrasted, despite their differences. While Milton, as a poet, may strike a truer note, through Dante the spirit of the Middle Ages will continue to live as long as men are attracted

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to verse possessing elements both eternal and divine.

Danton, George Jacques (1759-1794), a French statesman and patriot of the Revolutionary period. He took some part in planning the attack on the Tuileries Aug. 10, 1792, and voted for the death of the King. After Mirabeau he was the one statesman in the midst of the orators and theorists of the time. He looked upon the mob violence as a mere incident of the movement for liberty, and tried to join forces with the Girondists. When they held aloof he left them to their fate. After the fear of invasion was passing and a degree of internal security was felt he counseled moderation. This led to a break with Robespierre. He was thrown into prison, condemned on a charge of trying to restore the monarchy, and was later put to death.

Dan'ube, a river of Europe, second in size, of European rivers only to the Volga. It is about 1800 m. long and drains an estimated area of 300,000 sq. m. Rising in the Black Forest, in Baden, Germany, it flows in a northeasterly direction to Ulm, then altering its course it winds through Upper and Lower Austria, enters the great Hungarian plain, marks the boundary between Serbia and Hungary, pursuing an easterly course from Belgrade until, dividing into several branches and forming a delta with an area of about 4000 sq. m., it empties into the Black Sea. It receives important tributaries, and its waters wash the shores of countries widely different in productions and climate. At Württemberg it becomes navigable for small vessels; at Ratisbon, in Bavaria, for steamers. As the chief highway for the commerce of central Europe, its navigation was declared free to all nations at the Peace of Paris in 1856. Beyond Orsova is the famous Iron Gate, where rapids, eddies and whirlpools formerly endangered navigation. By blasting, some of the obstructions have been removed and through recent efforts the river has been made constantly navigable at this point. In 1878 it was agreed at the Berlin Con-

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gress that no ships of war navigate the Danube below this Iron Gate.

Dan'vers, Mass., a city of Essex Co., 19 m. n.e. of Boston, and 4 m. n.w. of Salem, on the Boston & Maine Railroad. It has important manufactories of shoes, leather, motor vehicles, brick, electric lamps. Danvers contains St. John's Normal College (Roman Catholic), the Massachusetts State Insane Hospital, Peabody Institute, founded by George Peabody, a resident of the place who donated \$200,000 in 1852 for the promotion and knowledge and morality, and the Essex County Agricultural School. The town contains also the villages of Danvers Center, Hathorne, Putnamville, Tapleyville and Danvers Port. Danvers was part of Salem until 1752, when it was incorporated as a separate town. Here the witchcraft delusion of 1692 first appeared. Population in 1920, United States Census, eleven thousand one hundred and eight.

Dan'ville, Ill., a city and county seat of Vermilion Co., 125 m. s. of Chicago, on the Little Vermilion River and on the Wabash, the Cleveland, Cincinnati, Chicago & St. Louis, the Eastern Illinois, the Chicago, Indiana & Southern. There is excellent street-car service, and the Illinois Traction System has a number of interurban lines. Danville is situated in the vicinity of an extensive coal field known as the Grape Creek district, and has important agricultural and manufacturing interests.

PARKS AND BOULEVARDS. Danville covers an area of ten square miles and has well-lighted, paved and shaded streets. There are many handsome residences. The Lincoln, Ellsworth, Douglas and Garfield parks are the largest of the city park system.

PUBLIC BUILDINGS. Among the prominent public buildings are the Federal, Y. M. C. A., Y. W. C. A., Elks Club, a number of banks, theaters, a city hall, substantial business blocks and many fine churches.

INSTITUTIONS. The educational institutions include a high school, 16 public and 14 parochial schools and a Carnegie

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library. A branch of the National Soldiers' Home was opened here in 1898.

INDUSTRIES. Danville has an extensive trade in coal, and its manufacturing industries are represented by zinc-smelting works, malleable iron works, foundries and machine shops, railroad car shops, artificial-ice plants, boiler and engine works, lumber mills, glass and bottle factories and is one of the largest brick producing centers in the United States. There is also an important trade in farm and dairy products.

HISTORY. Danville was first settled about 1830 and first incorporated in 1839. A city charter was granted in 1872. Vermilion Heights was annexed in 1905, South Danville in 1906 and Roselawn and Germantown in 1907. Population in 1920, U. S. Census, 33,736.

Danville, Pa., county seat of Montour Co., 56 m. n.e. of Harrisburg, on the North Branch of the Susquehanna River, at the base of the Montour Ridge, and on the Philadelphia & Reading and the Delaware, Lackawanna & Western railroads. The river is here crossed by a bridge. Danville is the seat of the Danville Institute, a state asylum for the insane. The first establishment erected in the United States for the manufacture of railroad iron was located here, and the borough contains some of the largest ironworks in the country. There are deposits of limestone and iron ore in the vicinity. The town has steel plants, blast furnaces, rolling mills, stove works, etc. It was settled in 1768. Population in 1920, U. S. Census, 6,952.

Danville, Va., a city of Pittsylvania Co., 141 m. s.w. of Richmond, on the Dan River and on the Southern and other railroads. It is built on high ground above the river and surrounded by the picturesque scenery of the Piedmont region. The land about Danville is particularly well adapted to the growing of tobacco (grain and fruits also are grown), and the city is one of the largest loose-leaf tobacco markets in the country. Danville ranks as one of the first cities in the state in the value of cotton goods produced. Excellent water power,

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utilized for manufacturing, is derived from the river. Chief among the industrial plants are tobacco factories and warehouses, cotton mills, knitting mills, furniture factories, trousers and overall factories, a cheroot factory and flour mills. Danville has a number of prominent educational institutions, among them Averett College (Baptist), founded in 1860; the Randolph-Macon Institute (Methodist Episcopal, South), opened in 1897; and Danville Military Institute, organized in 1890. Other noteworthy features of the city are the city hall, a Masonic Temple and a general hospital. One of the oldest cities in the South, Danville was incorporated in 1792; it was chartered in 1833. It was, for a brief period, the seat of the Southern Confederacy. Population in 1920, 21,539.

Danzig, *Dahn' tsik*, a free city in Europe, under the protection of the League of Nations, located near the Gulf of Danzig, surrounded by the Polish province of West Prussia. The Mottlau, a tributary of the Vistula, enters the city in two branches, one of which has been dredged to such depth that large boats may reach the city wharves; thus Danzig has long been an important commercial city. The corn from Poland, amber and liquors from the city itself and timber and sugar from the surrounding plain are the chief exports. The city still maintains many of its medieval features. The Hohe Tor, or High Gate, built in the 16th century and resembling a Roman triumphal arch, guards the entrance to Lange Gasse, the principal thoroughfare. This great street lined with historical buildings leads to the famous Lange Markt, a square in which stands the Junker-hof, used by former princes as a banqueting hall but now used as the exchange. The ancient town hall and the Neptune fountain also stand in the square. Aside from the interesting residences, with their ornamental balconies, their projecting gables and their broad stone terraces, the city has many fine churches, one of which, St. Mary's, is one of the largest Protestant churches in the world; the museum, the municipal

library, formerly a Franciscan monastery, and the government buildings are also noteworthy. The gardens, parks and promenades about the city give it an especially pleasing setting.

Danzig was a prosperous city under the rule of Teutonic knights. It joined the Hanseatic League in 1358, becoming a wealthy city. It became a free city under the protection of Poland in 1466. It passed under the rule of Prussia at the first partition of Poland. The Treaty of Versailles makes it once more a free city. Fully 50 bridges cross the various branches of the river within the city limits. Population, estimated, 170,400.

Dardanelles, *Dahr" da nelz'*, a narrow channel connecting the Sea of Marmora with the Ægean Sea and separating the continents of Europe and Asia. On the Asiatic side the fertile plains present a pleasing sight as they slope gradually up toward Mt. Ida. The European side is rugged and sterile, but densely populated. The Dardanelles is the Hellespont of the ancients. Xerxes crossed it when he invaded Europe in 480 B. C.; and at nearly the same place, Alexander the Great crossed it in 334 B. C. In the World War the great British offense of 1915 had for its objective the opening of this strait.

Darien, *Da" ri en'*, Gulf of, an arm of the Caribbean Sea indenting the northwestern coast of South America and touching Panama at the west and Colombia at the east. It is almost triangular in form, and its apex at the south receives the waters of the Atrato River through a narrow inlet known as the Bay of Chocó.

Dari'us Hystaspes, or **Darius I** (558-485 B. C.), the fourth King of Persia. After the suicide of Cambyses in 521 B. C., Darius put to death the usurper Gautama and took the throne, maintaining his position by force of arms. About 512 B. C. he sent an unsuccessful expedition against the Scythians. In 490 B. C. his great army under Datis invaded Greece, but was overwhelmed at Marathon, a defeat which Darius could not avenge because of an insurrection in

Egypt. He was remarkable as an organizer and statesman, strengthening the royal power by dividing his empire into satrapies. He also built a magnificent system of post roads.

Darius III, the last King of Persia, was raised to the throne by the eunich Bagoas, who had murdered his predecessor, Arses, 336 B. C. Darius was defeated at the Battle of Issus by Alexander in 333 B. C., and again defeated at Arbela in 331 B. C. He was killed while fleeing from Alexander.

Dark Ages, a period of the Middle Ages supposed to extend from the fall of Rome, 476, to the revival of literature, about 1150. During this period Europe was laying the foundation of many institutions, which were to endure to the present time or to be mighty factors in our present civilization. This period was also the beginning of many nations and languages.

Darling, **Grace Horsley** (1815-1842), the heroic daughter of a lighthouse keeper on Longstone, one of the Farne Islands. With the aid of her father she saved, in September, 1838, a part of the people aboard the wreck *Forfarshire*, which struck among the Farne Islands while bound from Hull to Dundee. Both father and daughter received medals and large gifts. Grace died of consumption four years later and was buried in the churchyard of Bamborough Castle, where an altar tomb with a reclining figure marks her grave.

Darling River, one of the largest rivers of Australia, a tributary of the Murray. It rises in northeastern New South Wales and flows in a southwesterly direction, forming for many miles the boundary between Queensland and New South Wales. Its total length is 1160 m., and is navigable from the city of Bourke to the city of Wentworth, where it enters the Murray.

Darn'ley, **Henry Stuart**, **LORD** (1545-1567), Earl of Ross and Duke of Albany, born in Yorkshire, England. His marriage with Mary Queen of Scots in 1565 was one of political convenience, and proved unhappy. It is thought that, in

revenge for Darnley's part in the murder of Rizzio, Mary aided the conspiracy which ended Darnley's life, by blowing up the house in which he was recovering from an illness. Their son became James I of England and James VI of Scotland.

Dart'er. See ANHINGA.

Darter. See PERCH.

Dartmouth, Dart' muth, College, an institution of higher learning located at Hanover, N. H., and named for the Earl of Dartmouth, its most active patron in Great Britain during the early days of its existence. It was the outgrowth of an Indian school established at Lebanon, Conn., in 1754, by Rev. Eleazar Wheelock. The first endowment was derived from the gifts of wealthy men and from popular subscriptions in England and Scotland, and these were supplemented by grants from Mass. and N. H.

Removing to New Hampshire for the purpose of being nearer the Canadian Indians, it received a charter from John Wentworth at that time Governor of the Royal Province of New Hampshire in 1769. The College had its birth in the wilderness and its first buildings were constructed of logs.

In 1816, by an act of the Legislature of New Hampshire, the control of the College was taken from the board of trustees without their consent and placed under State authority. The trustees sued for recovery of control and this constituted the famous "Dartmouth College Case," which was decided by the Supreme Court of the United States in 1819 in favor of the trustees, the case being argued in their behalf by Daniel Webster.

Connected with the College are the Dartmouth Medical School, the Thayer School of Civil Engineering and the Amos Truck School of Administration and Finance. The College grants the degrees of A.B. and B.S. and in the course of its history has graduated nearly fifteen thousand men.

Dar'win, Charles Robert (1809-1882), a famous English naturalist, born at Shrewsbury, the youngest son of Dr. Robert Waring Darwin. His mother

died when he was eight years old. After attending the Shrewsbury Academy for seven years, his father sent him to Edinburgh in 1825 to study medicine; but it became evident that he was not fitted by nature for this profession, and in 1828 he went to Cambridge to prepare for the ministry. Here he took his degree in 1831. During this period he became greatly interested in the study of natural history and gained the intimate friendship of several scientists older than himself.

In 1831 he studied geology on an excursion into North Wales with Sedgwick, and later in the year secured a position as naturalist in connection with a surveying voyage around the world, of the steamship *Beagle*. This journey lasted for five years, during which time the ship visited South America and neighboring islands, Tahiti, New Zealand, Australia, Tasmania, the Azores and other countries. It afforded Darwin opportunity to observe carefully the similarity between animals found in neighboring regions, and to note their variations. He also compared living animals with the fossil remains of those recently and more remotely extinct, and "the manner in which closely allied animals replace one another in proceeding southward."

It was his studies during this expedition that gave him the germ of his evolutionary theories. The immediate outcome of the voyage was the publication of a number of important books, from 1839 to 1855, describing the observations which he had made. In 1859 appeared his famous work on *The Origin of Species by Means of Natural Selection*, which at once attracted the greatest interest. In it Darwin gave a mechanical or natural explanation of the development of one species from another by the process of natural selection and the "survival of the fittest." The book worked a revolution in biological science, substituted the operation of natural law for the special-creation hypothesis as regards variation of species, and paved the way for the general acceptance of the doctrine of evolution.

Darwin extended his general theory to include man in his work *The Descent of Man and Selection in Relation to Sex* (1871), in which the upward progress of man from his lowest animal stages is traced as the result of natural causes, chief among which is the operation of natural selection. The theory came into fierce conflict with the theological views of the time, but gradually the thinking of the Christian world has adjusted itself to the underlying principles of evolution.

In 1839 Darwin married his cousin, Emma Wedgwood. They lived in London until 1842, when they removed to his country place at Down, which was his home thereafter until his death. His health began to fail in London, and during the remainder of his life the immense amount of work which he did was accomplished under a serious handicap of physical disability; and, indeed, would have been impossible but for the faithful and constant care of his devoted wife. Personally, Darwin was a gentle and kindly man, possessing brilliant conversational qualities and a remarkable facility in experimentation, painstaking and conscientious in his work, fertile in hypothesis, but with the rare openness of mind that led him at once to abandon previous conclusions if new evidence led elsewhere. He was greatly honored both during his life and at his death, and was buried in Westminster Abbey. Besides his two great works and those describing his voyage around the world, he wrote many other books, among which may be mentioned the *Fertilization of Orchids*, *Domesticated Animals and Cultivated Plants*, *The Expression of the Emotions in Man and Animals*, *Movements and Habits of Climbing Plants*, *Cross- and Self-Fertilization*, *The Power of Movement in Plants* and *The Formation of Vegetable Mold*. Consult *Life and Letters of Charles Darwin* (2 vols., New York, 1893).

Dask'am, Josephine Dodge. See BACON, JOSEPHINE DODGE DASKAM.

Date, or Date Palm, a tropical tree belonging to the Palm Family and chiefly known in temperate zones through its

fruit, which is imported in large quantities. The tree is a native of southern Asia and northern Africa. It has a tall, straight stem, growing from 60 to 100 ft. in height, and surmounted by a cluster of large, feather-form leaves, which droop over the inconspicuous blossoms. The flowers are of two kinds: those containing the pistil which is to develop into the fruit; and those containing the stamens,



DATE PALM

with the pollen, or fertilizing dust. The two kinds of flowers never grow on the same tree, and, as both kinds are necessary for the development of the fruit, groves are generally started from slips or cutting from the two kinds of trees, rather than from the seeds, which might produce all staminate or all pistillate trees. Trees produced from cuttings are always of the same kind as the parent stem.

The pistillate flowers contain three pistils each, only one of which ripens into fruit. Trees often bear as high as 500 to 600 lb. of these fruit clusters and thus furnish an important food product of the tropics. The fruit, as received in the Northern markets, is dried before being imported.

Not only is the date palm a source of wealth on account of its fruit but because of the usefulness of all its parts. The leaves are used for matting, the wood for construction of fences or light shelter, the fiber in making rope; the seeds, roasted, are used as a substitute for coffee, or an oil is extracted and the residue used as feed for cattle; and the terminal bud surmounting the stem is eaten as a vegetable. Some species of date palms are planted for ornament, but these are generally dwarf varieties.

The date palm is grown with increasing success in California, New Mexico, Arizona and Florida, and the industry gives promise of being a paying one, as the trees when once well started grow readily and bear fruit for one or two centuries.

Daubigny, Do" be' nye", Charles François (1817-1878), a French landscape painter, born at Paris, the son of an artist. At the age of 17 he opened a studio, earning enough for two years' study in Italy. He devoted himself to etching, wood engraving, lithography and black and white drawing, and by 1837 had attained fame as a painter of river and landscape scenes. His *Lock at Optevos* was purchased by the government, and in 1859 he was made a knight of the Legion of Honor, becoming an officer in 1874. In the decade following 1864, his finest pictures were painted. Daubigny delighted in a river, some trees and a few ducks as a pictorial subject; and it is said that the more pleased he became with a picture, the more ducks he added. The monetary value of his pictures has increased tenfold since his death. His works are scattered over Europe, England and America. The most famous of them are *Villerville-on-*

the-Sea, Moonlight, André's on the Oise and Return of the Flock—Moonlight.

Daudet, Do" da',- Alphonse (1840-1897), a French novelist and dramatist, born in Nîmes. At the age of 17 he went to Paris. His first volume of verse, published in 1858, revealed only mediocre talent, but he was given employment on the *Figaro* in 1859 and became a regular contributor to other important periodicals. His work as a dramatist, from 1862 to 1872, met with only moderate success. As a story-teller, however, his writings abound in humor, pathos and satire, and his novels and short stories immediately became popular. Among his best works are *Tartarin of Tarascon, Tartarin on the Alps, Numa Roumestan, Jack and Sapho.*

Daughters of the American Revolution, a patriotic society organized at Washington, D. C., in 1890. Any woman 18 years of age who is descended from an ancestor "who, with unfailing loyalty, rendered material aid to the cause of independence as a recognized patriot, as soldier or sailor, or as a civil officer in one of the colonies or states" is eligible for membership, providing she is acceptable to the society. There are over 1100 chapters and the membership exceeds 88,000. The purposes of the society are collection of relics, the erection of monuments and the fostering of reverence for the deeds of our forefathers who took part in the Revolution. The society has erected a memorial hall in Washington, where its headquarters are.

Dav'enport, Iowa, a city and county seat of Scott Co., 181 m. w. of Chicago and 252 m. n. of St. Louis, on the west bank of the Mississippi River and on the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Chicago, Milwaukee & St. Paul, the Burlington, Cedar Rapids & Northern and other railroads. The city is also connected with Rock Island and Moline (Ill.) by a ferry, several fine bridges and street-railway lines. Interurban electric lines connect with Clinton, Muscatine and Iowa City (Iowa), Galesburg and Monmouth (Ill.) and other towns and cities in the

fertile Mississippi Valley. River packets afford additional transportation. Opposite the city is the western terminus of the Hennepin Canal, which connects the Illinois and Mississippi rivers. The city has a large trade by rail and water in coal and grain, and forms, together with the cities of Rock Island and Moline, a vast commercial center.

PARKS AND BOULEVARDS. Davenport is attractively situated on the slope of a bluff which affords fine views of the landscape and river. There are 80 m. of paved and shaded streets and beautiful residences surrounded by lawns and gardens. The city contains a complete system of parks and drives, among the number being Vander Veer and Fejervary parks, Prospect and Riverview terraces and Lafayette and Washington squares. Suburban Island Park is a popular resort. A handsome boulevard also connects the eastern and western extremities of the city. Included in the area of parks is the island in mid-river, owned by the United States Government, Rock Island Arsenal, with a total of 990 acres. Outside of the government shops on the arsenal, the grounds are kept in a state of nature, making the arsenal an ideal natural-history preserve for the study of trees, flowers and birds. It also has 27 m. of perfect roadways. The arsenal golf links are national in importance, and golfers of wide repute come here to play.

PUBLIC BUILDINGS. The noteworthy structures include the Federal Building, Turner Hall, Masonic Temple, the county courthouse, the city hall, hotels, 13 banks, the Commercial Club Building costing \$75,000, substantial business blocks, the Y. M. C. A. Building and about 45 handsome churches. The city is the seat of a Catholic see and of an Episcopal bishopric.

INSTITUTIONS. Among the educational institutions are a high school, St. Katharine's School for girls (Episcopal), public and parish schools, Brown Business College, Immaculate Conception Academy, Academy of Sciences, which has an extensive scientific library and a fine collection of Indian and mound-builder rel-

ics, St. Ambrose College and a public library. Among the charitable and benevolent institutions are the Mercy, St. Luke's and St. Robert's hospitals, a hospital for the poor, several private sanitariums and a state orphanage; three Junior High Schools, the Palmer School of Chiropractic.

INDUSTRIES. The region surrounding Davenport is important both for its agriculture and coal mines. Wholesale slaughtering, meat packing and grain shipping are largely carried on, and the city contains manufactories of steel freight cars, wagons and carriages, woolen goods, agricultural implements, metal wheels, furniture, automobiles, bank and office fixtures, steel axles, hardware specialties, pearl buttons, corsets, type-setting machines, washing machines, brooms, macaroni, vinegar, flour, locomotives, pumps, cigars and other diversified products. The city is considered an advantageous industrial center.

HISTORY. Davenport was founded in 1835 and named in honor of Col. George Davenport, under whose leadership a company was formed for the purchase of a site. The place was incorporated as a town in 1838 and a city charter was granted in 1851. Population in 1920, U. S. Census, 56,727.

Da'vid, the most renowned of the kings of Israel, born in the 11th century B. C. He was the youngest son of Jesse of Bethlehem, a lineal descendant of Ruth, wife of Boaz (See RUTH). David first came into prominence during the kingship of Saul, when, a "ruddy" lad, "goodly to look to," he was called from tending the sheep to be anointed by Samuel (*I Sam. xvi*). David's combat with Goliath, his friendship with Jonathan, his position as court harpist and accession to the throne of Israel are familiar episodes of sacred history. His reign was characterized by great expansion of the kingdom and the selection of Jerusalem as the capital city. His own sins and the rebellion and death of his favorite son Absalom marred his personal happiness. Aside from his ability as a ruler and warrior, David is also remembered as the "sweet

singer of Israel," the author of numerous psalms of great beauty and power. He was succeeded by his son Solomon.

David, Jacques Louis (1748-1825), a French historical painter, born at Paris. He was a pupil of Boucher and of Vien and took the Prix de Rome with his picture *Antiochus and Stratonice*. The study in Rome which this prize made possible imbued the artist with the classic spirit, and he became the chief representative of his time of the reaction against the frivolous and immoral tendencies of monarchical France and, later, the great painter of the Revolutionary epoch. His *Deathbed of Lepelletier*; *Coronation of Napoleon I*, pronounced by some the finest historical painting of the last century; and portraits of leading contemporaries possess the highest realistic merit. He was exiled to Brussels upon the restoration of the Bourbons, and died there. In addition to the works already mentioned others worthy of particular mention are *Death of Socrates*, *Belisarius Asking Alms*, *Leonidas at Thermopylae* and the *Rape of the Sabines*, the last one of his most celebrated canvases.

Davies, Da' vez, Sir Louis Henry (1845-), a Canadian statesman, born at Charlottetown, Prince Edward Island, and educated at Prince of Wales College, Charlottetown. Admitted to the bar in 1866, for many years he was a leading barrister, being employed as one of the British counsel before the International Fisheries Commission of 1877. He served in the local Assembly from 1872 to 1879, in 1876 becoming premier and attorney-general of Prince Edward Island. While in office he exerted his abilities for the good of education and the public service. He represented the Liberals in the Canadian Parliament from 1882 to 1901, when he was appointed judge of the Supreme Court of Canada. Besides these activities, he has undertaken important political missions and is connected with various charitable enterprises. He is one of the brilliant Canadian orators.

Da'vis, Cushman Kellogg (1838-1900), an American statesman, born in

Henderson, N. Y. He graduated at the University of Michigan in 1857 and was admitted to the bar in 1860. In the Civil War he enlisted as a private in the Union army and rose to the rank of captain before he left the service in 1864. He began to practice law in St. Paul, Minn., and was governor of that state for one term, 1874-76. Elected to the United States Senate in 1887, he continued to serve in that body until his death. For many years he was chairman of the committee on foreign relations, and he was also a member of the commission which concluded the treaty of peace with Spain at the close of the Spanish-American War.

Davis, David (1815-1886), an American jurist, born in Cecil County, Md. He graduated from Kenyon College in 1832, studied law, was admitted to the bar and began practice at Bloomington, Ill. In 1844 he was elected to the State Legislature. He was judge of the Circuit Court from 1848 to 1862, in which year he was appointed justice of the United States Supreme Court. In 1877 he left the bench to enter the United States Senate, becoming president of that body after the death of Garfield. He resigned his seat in 1883. He was a personal friend of Lincoln and served as executor of his estate.

Davis, Jefferson (1808-1889), president of the Confederate States of America, born in Kentucky. He early went with his parents to Mississippi, which state became his home. He graduated from West Point Military Academy in 1828. During the next seven years he rendered valuable military service on the frontier, after which he resigned and became a cotton planter near Vicksburg. He entered Congress in 1845, but resigned the next year to serve as colonel in the Mexican War, in which he distinguished himself for gallantry. After the war he entered the United States Senate and served until 1851. In 1853 he became secretary of war, in which capacity he introduced several marked improvements into the service. He returned to the Senate in 1857, and at once became the recognized leader of the

Southern party in the contest for states' rights and slavery. He resigned his seat when Mississippi seceded from the Union in 1861, and was given chief command of the military forces of his state.

When the Confederate States organized an independent government on Feb. 18, 1861, Mr. Davis was appointed president. The history of Davis's presidency is that of the war itself, and need not be recounted here. After the fall of Richmond he was taken prisoner and confined for two years at Fortress Monroe. He spent the last ten years of his life in retirement, and wrote his version of the war in his book *The Rise and Fall of the Confederate Government*.

Mr. Davis was a forceful speaker and a man of exceptional executive ability. His was the guiding hand of the war on the Confederate side, and he served with devotion the cause he had espoused. In the later months of his administration his popularity waned and was not so great as that of Lee and other war heroes. He was buried at New Orleans, but his remains were later removed to Richmond, where a fine monument has been erected to his memory.

Davis, Rebecca Blaine Harding (1831-1910), an American novelist, born in Washington, Pa. After her marriage in 1863 with L. Clarke Davis, editor of the Philadelphia *Inquirer*, she devoted a part of her time to journalistic work. The realism of her first story, *Life in the Iron Mills* (published in the *Atlantic Monthly*) attracted wide attention. The labor question, a comparatively new theme in the fiction of the sixties, is dealt with in several of her writings. Among her works are *A Law Unto Herself*, *Kitty's Choice*, *Dallas Galbraith*, *Natasqua*, *Silhouettes of American Life* and *Bits of Gossip*.

Davis, Richard Harding (1864-1916), an American novelist, born in Philadelphia, Pa. Like his mother, Rebecca Harding Davis, he was interested in literary pursuits, and after studying at Lehigh and Johns Hopkins universities he began work as a reporter. In 1888 he was connected with the New York *Even-*

ing Sun, and two years later became manager of *Harper's Weekly*. He was war correspondent for the London *Times* and the New York *Herald* in the Turkish-Greek, Spanish-American, Anglo-Boer and Russian-Japanese wars. A bold spirit of adventure is a prevailing note in all his narratives, and they are further characterized by a virile, vigorous style. Among his many writings are *Stories for Boys*, *Van Bibber and Others*, *Soldiers of Fortune*, *The West from a Car Window*, *The Cuban and Porto Rican Campaigns*, *The Congo and the Coast of Africa*, *Ranson's Folly* and *The Man Who Could Not Lose*.

Davis Strait, a narrow sheet of water connecting Baffin's Bay and the Atlantic Ocean, and separating Greenland and Baffin Land. Its width varies from 180 to 500 m. and its greatest depth is 5000 ft. It was named after John Davis, who discovered it in 1585.

Da'vy, Sir Humphry (1778-1829), an English chemist whose work has a literary as well as a scientific value. He began his chemical studies as an apothecary's apprentice, planning to take up the study of medicine. His first noteworthy experiments were with laughing-gas, and these were followed by investigations into the electrolytic preparation of various elements. From this time on his attention was turned chiefly toward the realm of electrochemistry. His best-known achievement was the invention of the miner's safety lamp, which indicates the presence of dangerous gases in mines. By this invention, upon which he took out no patent, he has conferred untold benefit upon those engaged in underground mining. Davy was, at different times, the superintendent of the Medical Pneumatic Institution of Bristol, lecturer and professor of the Royal Institution of London, and head of various commissions appointed by the British Government to investigate many scientific questions.

Dawes, Dawz, Henry Laurens (1816-1903), an American statesman, born in Cummington, Mass. He graduated at Yale in 1839, taught school, was editor

of the *Greenfield Gazette* and of the *Adams Transcript*, and, after studying law, was admitted to the bar. In 1848 he was elected to the State Legislature. He was a member of the House of Representatives from 1857 to 1873 and United States senator from 1875 to 1893. Because of his interest in the education and fair treatment of the Indians, he was placed at the head of the Indian Commission for the Five Civilized Tribes. In 1869 he introduced a bill to provide for issuing weather bulletins. He also introduced important tariff measures.

Dawson, the capital of the Yukon Territory, Canada, situated on the right bank of the Yukon River 1500 m. from its mouth. It is the center of the Klondike gold-mining region and is surrounded by a beautiful mountainous country. A fleet of river steamers and the telegraph facilitate communications with the town. Coal deposits have been found, and in all respects Dawson is a typical mining town. Two fires in 1899 destroyed a large part of the town. It has three opera houses and several hotels. Shortly after the gold rush of 1896 the population ran up to 20,000; in 1901 it was reduced to 9142. At present a normal estimate places it at 5000.

Dawson, George Mercer (1849-1901), a Canadian geologist and explorer, born in Nova Scotia. He was a student of marked ability in McGill University and in the Royal School of Mines, London. In 1873 he represented the British North American Boundary Commission, and was appointed assistant director of the Geological Survey of Canada in 1874, becoming director in 1895. He led the Yukon expedition in 1887, and was a British Bering Sea commissioner, serving with Sir George Baden-Powell, in 1891. Among other distinctions he received the Bigsby medal from the Geological Society of London. He contributed to the *Canadian Naturalist* and to the *Quarterly Journal* of the Geological Society of London, and published a report on the *Geology and Researches of the Forty-ninth Parallel*.

Dawson, Sir John William (1820-

1899), a Canadian geologist, born in Pictou, Nova Scotia. While at Pictou College and Edinburgh University he showed a keen interest in science, and particularly in geology. In 1842 he accompanied Sir Charles Lyell on an expedition to examine the geological formations of Nova Scotia. He was superintendent of education for Nova Scotia in 1850-53, and later was professor of natural history and vice-chancellor of McGill University. He was the first president of the Royal Society of Canada, which society he was instrumental in founding. Was also president of the American Association for the Advancement of Science and of the Geological Society of America. In his *Modern Ideas of Evolution* he maintained a strict theological attitude and opposed the theories of Darwin. He also wrote *The Dawn of Life*, *Acadian Geology, Science and the Bible*, *The Origin of the World*, and *The Meeting Place of Geology and History*.

Dawson, William Bell (1854-), a Canadian civil engineer, born in Pictou, Nova Scotia and educated at McGill University and in Paris. In 1881 he made a topographical survey of part of the gold fields of Nova Scotia; later, for the Dominion Bridge Company, he designed the cantilever bridge over the St. John River, and from 1884 to 1893 he was with the Canadian Pacific Railway. Since then he has been in charge of the tidal and current survey, department of marine, in which capacity he has done notable work. In 1902 he was awarded the Watt gold medal by the Institute of Civil Engineers; London, and the Gay prize by the Academy of Science, Paris.

Day, a division of time to which various meanings are given, as the period of light distinguished from the period of darkness; the time required for the earth to make a complete rotation on its axis in reference to a fixed star; the period from the time when a given meridian is under the star until it is under it again. This is called a sidereal day and is exactly 23 h., 56 min., 4 sec. The solar, or civil, day is the period between the time when a given meridian is under the sun until the same meridian is again under the sun, and is about four minutes

longer than the sidereal day. This difference is due to the earth's movement around the sun, which causes the sun to change its relative position among the stars about one degree for each rotation of the earth, and it requires about four minutes for the earth to catch up with this movement. Moreover, since the earth moves with varying degrees of velocity in different parts of its orbit, the solar day varies in length. To avoid the inconvenience arising from this variation, a mean solar day of 24 hours is adopted, and the difference between this and the actual solar day is known as the equation of time.

The hour for beginning the day has varied among different peoples. With the Hebrews it originally began at sunset, and many of these people still observe the custom. This was also the custom with the New England colonists. The Greeks and Romans began the day at midnight, and this is the custom now generally practiced by all civilizations.

The civil day is divided into two divisions of 12 hours each, extending respectively from midnight to noon and from noon until midnight. The abbreviation a. m., ante meridian, stands for forenoon; and p. m., post meridian, stands for afternoon. The sidereal day used by astronomers is divided into 24 hours, but the divisions into forenoon and afternoon are not recognized. Some advocate doing away with these divisions in the civil day, but time has been reckoned on this plan for centuries and it is not easily changed. The Canadian Pacific Railway, however, has adopted this plan for its time-tables and it seems to work satisfactorily. France also has adopted this system. According to this plan, the hours are numbered from 2 to 23, and 3 p. m. is the 15th hour in the day.

The length of day and night varies on different parts of the earth, but one-half the earth is always in the light and one-half in the shadow or darkness. At the vernal and autumnal equinoxes the days and nights are equal all over the earth, and they are always equal at the equator. The length of the day on a

given parallel of latitude is equal to the length of the night on the same parallel six months later. The days of the week are described under their respective titles. See also SEASONS; SOLSTICE; EQUINOX.

Day, William Rufus (1849-), an American jurist, born in Ravenna, Ohio. After graduating from the University of Michigan he studied law and began practice in Canton in 1872. He was judge of the Court of Common Pleas in 1886-90, was made assistant secretary of state in 1897 and succeeded John Sherman as secretary of state in 1898. The same year, however, he resigned to become chairman of the United States Peace Commission which met in Paris to conclude a treaty of peace with Spain. In 1899-1903 he was United States judge of the sixth circuit. President Roosevelt appointed him associate justice of the Supreme Court in 1903.

Day Lily, a beautiful lawn and garden plant of the Lily Family. There are several species, mostly Japanese or Siberian plants, which have been naturalized here. In all, the roots are large and knotted and from these may rise a leafy stem or simply a cluster of curving root leaves. The leaves are generally long, narrow and stemless, but those of the white day lily are short-stemmed and heart-shaped. The flowers have six-parted, funnel-like calyx cups, which are colored like petals, and six stamens, which proceed from the throat of the flower. The pistil is longer and extends beyond the mouth. Day lilies are used as border plants in gardens or as ornamental house and conservatory plants. Our best-known day lilies are tawny or lemon-yellow, but others, especially in the highly-cultivated varieties, may be white, blue, lilac or variegated. All have the sweet lily fragrance which is apt to be overpowering if the flowers are kept in a closed room.

Day'ton, Ky., a city of Campbell Co., on the Ohio River, opposite Cincinnati, Ohio. Transportation facilities are provided by the Chesapeake & Ohio and other railroads. The city contains several large manufacturing plants, the

chief factory products being watch cases and pianos. Its leading institution is the Speers Memorial Hospital. Settled in 1849, the place was incorporated in the same year and was named Jamestown. Its present charter dates from 1893. Population in 1920, U. S. Census, 7,646.

Dayton, Ohio, a city and county seat of Montgomery Co., 60 m. n. of Cincinnati and 67 m. s.w. of Columbus, at the confluence of the Stillwater and Mad rivers and Wolf Creek with the Great Miami River, and on the Erie, the B. & O., the L. & H., D. T. & C., D. & U., the Pennsylvania, the C. C. C. & S. L. railroads. Seven interurban electric lines, with a total mileage of over 400 m., radiate in all directions through the populous Miami Valley, of which Dayton is the center. The city, which has an area of over 17 sq. m., is situated 800 ft. above sea level. Five concrete, arched bridges cross the rivers at various points throughout the city. The surrounding country is largely agricultural, and fruit, vegetables and tobacco are extensively grown. Natural gas is used for domestic and heating purposes. The Mad River furnishes excellent water power for manufacturing by means of a canal and very extensive measures have been taken to prevent floods.

PARKS AND BOULEVARDS. Dayton is well laid out and is known as a City of Homes. The boulevard and park along the river add to the attractiveness of the city. The streets are broad and well shaded and Robert and Miami boulevards are especially beautiful. Lakeside, Fairview, Cooper, Outing, Van Cleve and Far Hills, with a total of 700 acres, constitute Dayton's park system. Hills and Dales, a natural park of 700 acres, is located immediately south of the city.

PUBLIC BUILDINGS. Among the noteworthy buildings are the Union Station, old and new courthouses. Memorial, Commercial and Arcade buildings, the Y. M. C. A. Building, costing \$600,000, Y. W. C. A. and Federal buildings, many fine hotels, theaters, banks, office buildings and business blocks. There are

about 120 churches, many of them of handsome architectural design.

INSTITUTIONS. The educational institutions include a normal school, three high schools, University of Dayton, Notre Dame Academy, Bonebrake Theological Seminary, public and parochial schools, a manual-training school and two commercial colleges. The Central Theological Seminary of the German Reformed Church was established here in 1908. Dayton contains five libraries and had the first library incorporated in the state, which was opened in 1855. Other institutions include the National Military Home for disabled soldiers, one of the finest and largest in the United States, a state insane hospital, the Miami Valley, St. Elizabeth's and Protestant hospitals, several sanitariums, Door of Hope for homeless girls and widows and children's homes.

INDUSTRIES. Dayton is the fifth city in the state in population and is the seat of extensive industrial establishments comprising manufactories of cash registers, railroad cars, and airplanes, agricultural implements, clay-working machinery, filters, turbines, sewing machines, automobiles, cast-iron vases, areoplanes, automatic toys, bookbinders' machinery, flour, clothing, furniture, tobacco, architectural iron, stoves, hollow ware, soap, computing scales, hoisting jacks, shoe lasts, golf clubs, United States stamped envelopes and stamped-envelope paper, cotton and woolen goods, cement tools, and water wheels.

HISTORY. The site of Dayton was purchased in 1795 by a number of Revolutionary soldiers. In 1805 the town was incorporated and named in honor of Gen. Jonathan Dayton, one of the earliest owners of the included territory. The first city charter was granted in 1841. In 1913 the city adopted a new charter providing for government by a city manager and a legislative commission. Population in 1920, United States Census, 152,559.

Deaconess, *De' kun ess*, the name applied to a religious order for women in a

number of branches of the Christian Church. So far as known, the order was established during the time of the apostles, for it is referred to in *Romans xvi, 2*, and *Timothy v, 9*. The duties of the members were to assist the deacons in their work, particularly in the care of women. The order was abolished in the fifth century. However, in 1836, the United Evangelical Church reestablished the order in Prussia. The first order in the United States was established by the Protestant Episcopal Church in Baltimore, and in 1888 the Methodist Episcopal Church at its General Conference authorized the establishing of an order of deaconesses. The members of the order are required to make special preparation for the work, and the various churches have schools devoted especially to this work. The work of the modern orders is similar to that of the early ones. In the Catholic and some Episcopal churches sisterhoods do the work of deaconesses.

Dead Letter Office, a branch of the Federal Post Office Department to which is sent all mail that cannot be delivered. Such mail as has remained in the office for one month, and is properly advertised but still remains unclaimed and has no return address upon the envelope, other mail that is improperly or illegibly addressed, and articles excluded from the mails by postal regulations are sent to this office. Here they are opened, and if the sender's name is ascertained they are returned. If they cannot be returned nor sent to the one for whom intended they are disposed of at public auction.

Dead Sea, a celebrated lake in Palestine, in Scripture called *Salt Sea*, *Eastern Sea* and *Sea of the Plain*. It lies about 6 m. s. of Jericho, midway in the great valley extending from Mt. Hermon to the Gulf of Akabah. It has the shape of a complete oval, is about 47 m. long and from 9 to $9\frac{3}{4}$ m. wide, and is approached on all sides by a steep descent. The surface is about 1300 ft. below the level of the Mediterranean, being the lowest depression on the globe. The Jordan River enters the lake at its northern extremity and there are other

tributaries, but it has no outlet. Its shores abound in sulphur and rock salt, lava and pumice, and its water, though clear and attractive to look at, is loathsome and destructive of every form of life. Its specific gravity is such that the human body will not sink in the Dead Sea. These peculiarities are due to the ingredients of the water: common salt, chloride of magnesium, chloride of calcium and other substances. The Dead Sea has interesting associations with Jewish history, but is not mentioned in the New Testament.

Deaf, Def, and Dumb, Education of the. No systematic attempt to educate the deaf was made previous to 1648, when John Bulmer published a book advocating the education of deaf-mutes. Following this, there were a few attempts to educate the mutes in the families where they lived. Although these were, in the main, successful, it was not until 1760 that Thomas Braidwood opened in Edinburgh the first private school for the deaf on British soil. In 1792 Braidwood opened the London Asylum, which is considered the first public English school for the deaf. The first public school for the deaf in any land, however, was opened at Leipsic in 1778. The vocal system of instruction was early introduced into this school.

In America Dr. W. Thornton of Philadelphia published in 1793 an essay on *Teaching the Deaf to Speak*. In 1811 in both New York and Virginia, a grandson of Braidwood made unsuccessful attempts to establish schools for the deaf. In Connecticut, however, private contributions were secured by a few enthusiastic persons; and in May, 1816, they sent the Rev. Thomas H. Gallaudet to Europe to investigate conditions there. In the same month, with an appropriation of \$5000, the Legislature incorporated the Connecticut Asylum, subsequently known as the American School for the Deaf, at Hartford. Upon the return of Gallaudet, this school was opened, Apr. 15, 1817; and two years later it received by act of Congress a land grant which yielded an endowment

amounting to upwards of \$350,000. The success of the experiment at Hartford led to the admission there of pupils supported by legislative appropriations, from the other New England States, from South Carolina and Georgia. Dr. Gallaudet married one of his deaf pupils, Sophia Fowler, and their sons have rendered services of untold value to the nation.

Meantime the Empire State had incorporated in 1817 the New York Institution for Instruction of the Deaf and Dumb, which from 1831 to 1867 was directed by Harvey P. Peet, who had been one of the most successful of the Hartford instructors. Pennsylvania was fortunate in the establishment of a similar institution at Philadelphia in 1820, through the efforts of Joseph Seixas. Other states soon recognized that, by the methods already developed, it had become quite as *possible*, if not as easy, to give a good common school education even to those born deaf as to those not thus handicapped. Moreover, it seemed obvious that the interests of the commonwealth, not less than justice to the individual, must ever demand special schools for all who, through no fault of their own, were unable to profit by those schools which served with considerable adequacy the needs of the majority. This belief soon crystallized into action. To-day every state maintains one or more schools for the deaf, the total number being about 137. These American state schools report more than 1200 instructors and over 17,000 pupils. Their libraries contain some 120,000 volumes, they expend about \$3,000,000 per annum, and the total value of their properties exceeds \$16,000,000. There are also in America some 20 private schools for the deaf, enrolling 700 pupils, and numerous day schools to which further reference is made in this article. Some of those who have studied this subject profoundly have come to believe that it is, on the whole, better that the state should maintain numerous widely scattered day schools rather than concentrate the deaf in large numbers in a single institution.

The deaf have certain obstacles to overcome. It seems not unreasonable that, while receiving daily assistance from an expert teacher, they may more rapidly assume the manners and learn the articulation of hearing persons, if they associate with them when outside the classroom.

Moreover, prolonged association in large state schools tends naturally to the formation of pleasing acquaintances and strong attachments between the deaf, just as do the school life and college life of other young people. To counteract the tendency to intermarriage between the deaf, which is detrimental to society, resulting from these attachments, the segregation of the sexes is perhaps less feasible than the substitution of local day schools which bring the deaf together for only a part of the time. Believing that local day schools are better able to serve both the interests of the individual and the interests of society, a number of states have enacted legislation favorable to such schools; and, of all the pupils in their public schools for the deaf, Massachusetts, New York, Illinois, Michigan and Wisconsin now have one out of every four in their day schools. Michigan alone had 14 such schools in 1910, while Wisconsin led with a total of 20.

In the past there have been some differences of opinion regarding the most effective methods of teaching those who hear imperfectly, or not at all, and especially those who have been deaf from birth. The influence of Alexander Melville Bell, who invented and introduced the methods of visible speech, and that of his distinguished son, Alexander Graham Bell, have done much to increase the efficiency of all instruction in schools of this kind. See *VISIBLE SPEECH*; *BELL, ALEXANDER GRAHAM*; *BLIND, EDUCATION OF THE*; *MANUAL TRAINING*; *EDUCATIONAL, INDUSTRIAL*; *TRADE SCHOOLS*.

Deák, Da' ahk, Ferencz (Francis) (1803-1876), a Hungarian statesman, born in Söjtör, Zala, Hungary. He was elected to the National Diet in 1832,

gaining prominence as a leader of the Liberals. After the Hungarian Revolution of 1848 he became minister of justice, but resigned when Kossuth came into power, and lived in retirement until 1860, when he again returned to the Diet. Vigorously defending the rights of his country, he protested against the tyranny of the Austrian Government and demanded the constitution of 1848 in an address to Francis Joseph in 1861. The request was not granted, however, until after the defeat of Austria by Prussia in 1866. Through his efforts the dual form of government between Austria and Hungary was established. He is ranked as one of the greatest statesmen of Hungary.

Deane, Silas (1737-1789), an American diplomat, born in Connecticut. Graduating from Yale in 1758, he studied law and was admitted to the bar. He was a delegate to the First and Second Continental Congresses, was agent for the United States in France and was one of the three commissioners who signed the treaty of alliance with that country in 1778.

Dear'born, Henry (1751-1829), an American soldier who, during the Revolution, served as captain at Bunker Hill and distinguished himself at Stillwater, Saratoga and Monmouth. The British captured him at Quebec but, being released the following year, he was at Yorktown with Washington. From 1793 to 1797 he was United States congressman, in 1795 he was commissioned major-general, he was secretary of war in Jefferson's cabinet from 1801 to 1809 and served with honor in the War of 1812. His last important public service was as minister to Portugal from 1822 to 1824.

Death's-Head Moth, a large moth of the Hawk Moth Family. It may be easily recognized by its large, thick body and head and its general dark color, relieved by a pale, skull-like mark upon the back of the thorax. The forewings are large and mottled with indefinite lines of yellow and pale rose. A cream-colored circle is noticeable near the center of

each. The hind wings and abdomen are yellow above, marked with brown, and orange-colored underneath. The antennæ are straight and slightly fringed at the ends. The death's-head moth is one of the largest and strongest of moths. When at rest, the hind wings are folded and the forewings lie close to the body. It flies chiefly by night to secure the exuding sap of trees and even honey from the hive of the bee, but it rarely visits the flowers.

The larva is a fleshy, green "worm" conspicuously marked with alternating, black-spotted V's of yellow and blue. The pupa has a large maroon case, which may be found in the autumn clinging to the withered stems of weeds. The larva feeds upon the foliage of the potato, thorn apple, buckthorn and jasmine, but does not occur in sufficient numbers to do great harm. See **HAWK MOTH**.

Death'watch', a cylindrical beetle of the Ptinus Family. It is found on flowers, trees, furniture and in the woodwork of houses, where it does damage both in the larval state and as an adult. It has two eleven-jointed antennæ situated in front of the eyes and a brown covering marked with one small yellow spot. The name, deathwatch, refers to its habit of tapping its head rapidly against the wood in which it burrows; the sound constitutes a call to its mate and is generally answered immediately. In the stillness of night the tapping has a weird sound and has been the foundation of many ghost stories and many superstitious fears.

The larva of one species of death-watch is said to be destructive of books and is known as a bookworm. See **BOOKWORM**.

Deb'orah, a Hebrew prophetess who lived during the period of the judges. When the people of Israel were oppressed by Jabin, the Canaanite, they came to her in Mt. Ephraim for counsel. Through her influence a force of 10,000 men, under the command of Barak, encamped on Mt. Tabor, where they were besieged by a vast host of the enemy. At the word of Deborah the Israelites

rushed upon the army of Jabin and put it to flight, thereby ending an oppression of several years' duration. The song of Deborah, in celebration of the victory (*Judges v*), is one of the oldest lyrics in existence.

Debs, Eugene Victor (1855-), an American labor leader and lecturer, born in Terre Haute, Ind. After leaving the public schools, he was house painter, railroad fireman and grocery clerk. In 1879 he was elected city clerk of Terre Haute. As a member of the State Legislature, he was instrumental in securing improved labor laws. For 14 years he was secretary and treasurer of the Brotherhood of Locomotive Firemen. He helped to form the Order of Railway Employees, and in 1893 became president of the American Railway Union. During the strike of workmen of the Pullman Palace Car Company in Chicago in 1894, he was charged with conspiracy, but was acquitted. He was imprisoned for six months for contempt of court, in violating an injunction. This caused the extensive use of the term "government by injunction" in the presidential campaign of 1896. Debs was nominated for president by the Social Democratic Party in 1900, 1904, 1908, 1912 and 1920. In 1919 he was convicted of violation of the espionage act but the sentence was commuted in 1921.

Debt, *Det*, in law, a sum of money due because of special contract or a particular agreement. A debt can be recovered through a civil suit at law. In case the debtor is unable to pay in money enough of his property may be forcibly seized and sold to pay the debt and cost of prosecution and sale. In such cases, however, the law in most states exempts from seizure property to the value of \$400 to \$500. See **BANKRUPT LAW**.

Decatur, *De ka' ter*, Stephen (1779-1820), an American naval officer, born in Sinnepuxent, Md. In 1798 he was appointed midshipman in the navy, and was commissioned lieutenant the following year. He served with distinction in the operations against Tripoli in 1801-

05, winning fame by his daring recapture and burning of the United States frigate *Philadelphia*, which had been seized by the enemy. In the War of 1812, while in command of the warship *United States*, he captured the British frigate *Macedonian*. After the war he was sent to the Barbary States in command of a squadron of nine vessels to inflict punishment for depredations on American commerce. By his successful operations against Algiers, Tunis and Tripoli he gave the deathblow to the system of tribute to the piratical Barbary States, and thereby won the thanks of all Europe. Upon his return to the United States he was made naval commissioner. He was killed in a duel with Commodore Barron.

Decatur, Ill., a city and county seat of Macon Co., 38 m. e. of Springfield and 173 m. s.w. of Chicago, on the north bank of the Sangamon River and on the Illinois Central, the Cincinnati, Hamilton & Dayton, the Wabash, the Vandalia and other railroads. There is an excellent street-car system throughout the city, and interurban lines connect with St. Louis, Springfield, Peoria, Danville, Bloomington, Champaign and other towns and cities. Decatur is situated in an agricultural and coal-mining region and is an important trade center of several counties.

PARKS AND BOULEVARDS. The city contains well-paved, lighted and shaded streets and many handsome residences. There are a number of parks, Nelson and Fairview being the largest.

PUBLIC BUILDINGS. Among the prominent buildings are the county courthouse, Federal Building, municipal buildings, several banks, substantial business houses and about 25 churches.

INSTITUTIONS. The leading educational institution is the James Millikin University (Presbyterian), founded in 1901. This institution is coeducational and has a large number of students. Other institutions include a high school, public and parochial schools, a Carnegie library and an academy. St. Mary's Hospital is a well-equipped institution.

INDUSTRIES. Decatur is an important shipping point for agricultural products, live stock and coal taken from mines in the city and vicinity. The principal manufacturing establishments include corn mills, which are among the largest in the United States, ironworks, flour and planing mills, agricultural-implement works, casket and coffin works, bridge works, garment factories, railroad repair shops, soda-fountain works, street-car and car-truck works and manufactories of cutlery, plumbers' supplies, gas and electric-light fixtures, office and store fixtures and furniture.

HISTORY. The first settlement was made in 1830 and the town was incorporated six years later. The city has the commission form of government. Population in 1920, 43,818.

Decatur, Ind., a city and the county seat of Adams Co., 21 m. s.e. of Fort Wayne (near the eastern boundary of the state), on St. Mary's River and on the Erie, the T., St. L. & W., G. R. & I., and N. I. Traction R. R. There are several fine stone quarries near the town, which are worked with considerable profit. The manufactures include brick, tile, machinery, butter tubs, egg cases, staves and various other lumber products. Decatur was settled in 1840 and incorporated in 1882. Population in 1920, 4,762.

Decem'ber, the 12th and last month of the year, containing 31 days. The name is derived from the Latin word for tenth, as this was the tenth and last month of the old Roman year. When the calendar was changed by the adding of January and February, the name of December was retained, although it became the 12th month. The winter solstice occurs about the 22nd of this month. The Anglo-Saxons called it the midwinter month and the Yule month. The month is beloved throughout all Christendom on account of the Christmas holiday occurring on the 25th. See **CHRISTMAS; MONTH; SOLSTICE; YEAR.**

Declaration of Independence, the document through which the Thirteen Colonies of Great Britain in America announced their independence of the

Mother Country. The formal declaration was preceded by resolutions in the assemblies of nearly all the colonies, declaring that independence was necessary and inevitable. On May 15, 1776, John Adams offered a resolution in the Continental Congress in Philadelphia that each state form its own independent government, and on June 7 another formal resolution was introduced by Richard Henry Lee in the epoch-making statement, "That these united colonies are, and of right ought to be, free and independent states; that they are absolved from all allegiance to the British Crown, and that all political connection between them and the State of Great Britain is, and ought to be, totally dissolved."

On June 11 a committee was appointed to prepare a declaration of independence, its members being Jefferson, Franklin, John Adams, Roger Sherman and Robert R. Livingston. They reported on June 28, and on July 1 the great debate began. Lee's resolution was carried July 2. The Declaration was adopted July 4 by the delegates of 12 colonies, those representing New York not voting, since they had not been authorized to support the movement for independence. On July 9, however, a New York convention pledged that state to support the Declaration. The document was engrossed on a parchment in accordance with a resolution passed by Congress on July 19, and on Aug. 2 was signed by 53 members then present. It was drafted by Thomas Jefferson and but little changed from his copy. The document itself was assigned for safe-keeping to the department of state upon the organization of the National Government. A facsimile was made in 1823, by order of John Quincy Adams, then secretary of state, for the original signers and their families.

Declination, Dek" lin a' shun, distance of a heavenly body north or south of the celestial equator measured in degrees on the hour circle (celestial meridian) passing through the body. Declination corresponds to latitude on the earth. North declination is marked + and south. —. The term is also used of the variation

of the magnetic needle from the true north. This declination varies at different places and is not always the same in one place. See CELESTIAL SPHERE; MERIDIAN; RIGHT ASCENSION.

Dec'ora'tion Day. See MEMORIAL DAY.

Dedham, Ded' am, Mass., county seat of Norfolk Co., 9 m. s.w. of Boston, on the Charles River and on the New York, New Haven & Hartford Railroad. The town is now chiefly a residential one. Its manufactures include woolen and cotton goods, pottery, carpets and dairy products. It is a favorite residential suburb of Boston. The town is one of the oldest in the state and is noted as having established in 1644 the first public school in America supported by a general tax. Dedham was settled in 1635 under the name of Contentment. In 1636 it was incorporated as a town under its present name. This is the native place of Fisher Ames. Population in 1920, 10,792.

Deduc'tive Method, that method of reasoning or teaching, by which one proceeds from general statements or rules, prepared very likely by others, but the truth of which is assumed, to the consideration of particular cases or facts. It is the reverse of the inductive method. With pupils of rather well-developed reasoning powers, it may be used to advantage in certain subjects taught in grammar and high schools, and may be used still more often and more extensively in colleges, universities and graduate schools. The inductive method is used in teaching cube root with geometrical blocks; the deductive, when the rule is first taught and then applied in the solution of problems. The algebraic method, in which such a binomial as $x+y$, is used, is a combination of the inductive and deductive methods. See INDUCTIVE METHOD.

Deed, in the ordinary legal sense, a written instrument conveying real estate from one party to another. The party conveying the property is known as the grantor, and the party receiving it as the grantee. There are two kinds of

deeds pertaining to real estate: the warranty deed, in which the grantor agrees to defend the title against all claims, and the quit-claim deed, in which the grantor conveys to the grantee whatever title he has in the property. The deed must mention some consideration, contain a description of the property and be signed by the grantor, the grantee and two witnesses. When the grantee receives it, it must be recorded in the office designated by the laws of the state. This is usually the office of the county recorder or register of deeds. In some of the New England States the record is made in the office of the town clerk of the town in which the property conveyed is located.

Deer, a large family of Mammals whose chief characteristic is the bearing of antlers, a specialized form of horns. Nearly 60 species of deer are known, mostly American or Asiatic, although they are known everywhere except in Australia and Africa, south of the desert region. All are alike in having short, brittle hair, sometimes lengthened at the neck into a mane which is particularly thick during the mating season; the ears are erect and expressive and the dark eyes are large and questioning; underneath the eyes are open glands, much like tear ducts; the plumed tail is short and erectile.

The growth of the antlers of the deer is an interesting process to observe. In the spring the thin, hornless and emaciated animals may be seen wandering listlessly about the yet barren woods seemingly worn out from their winter struggle for existence. The male has on his forehead and between the ears two tender spots where the horns of the preceding year were located; presently small protuberances appear at these points, little elevations throbbing with the life of thousands of active building cells and covered with the softest velvet. These growing horns are extremely sensitive and bleed at the slightest wound. As they grow, the deer carefully protects them and is generally found, solitary and inactive, in some peaceful, woodland

glade. On the horns a few inches from the head a ring called the bur is formed, and above this the antlers branch in the manner familiar in the mature deer. After the antlers are full grown the velvet dies and is rubbed off by the buck upon the trunks of trees or heaps of rocks. At this period the buck is in his highest vigor, and his hardened horns, which he clashes fearlessly against the rocks or against the antlers of his rival, bear little resemblance to the tender, living prominences of the spring. When shed, the horns decay at the bur and are then easily broken off.

Probably no animal goes through more changes in coat than the deer, for it is fashionable enough to don a different one with each succeeding season. This is particularly true of the red deer, a white-tailed variety which is common in North America. In the spring, the season of the deer's poorest appearance, the coat is gray and shabby; as the horns develop upon the male and as the female returns to her haunts with her young the coat becomes a beautiful golden shade and the young are marked with soft, yellowish-brown and white spots. In September a third change takes place, and the short, glossy hair assumes a deep slaty-blue which blends with the autumn landscapes in the tracts of burned-over woodlands where the deer comes to feed upon the quickly springing grasses; this coat is probably the richest of all, but is the one least often mentioned. As the snows fall and the cold suggests the need of warmer covering, a thicker growth of hair appears which is yellowish-gray in tone and soft in texture. Each of these coats, it will be noticed, is of a coloration which aids in concealing the deer at the season during which it is donned.

The deer is one of the chief game animals and thousands of hunters during the open season pursue it in its Northern haunts. The farmer of the North approves of its slaughter, for the deer is a destructive animal and the farmer's growing vegetables and young fruit trees are in constant danger from this handsome but unscrupulous visitor. How-

ever, in most states where the deer is found it is protected by law during certain seasons, so that its extermination is not probable. The flesh of the deer, called venison, is highly prized, and from the hide buckskin for moccasins and mittens is prepared. Various members of the Deer Family, treated under their respective titles, are: elk, wapiti, stag, fallow deer, roebuck, musk deer, reindeer, moose and caribou.

Deer Mouse, or White-Footed Mouse, an outdoor member of the Rat Family found in meadows or near wood lots and farm homes. It is a plump little fellow about the size of the house mouse, and has the same bright eyes, pointed nose and rounding ears. Its body and long tail are fawn-colored above but pure white underneath. The deer mouse is clever and hardy, living, like the squirrel, upon grains, nuts, berries and small wood insects.

Defiance, Ohio, the county seat of Defiance Co., lying in the northwestern part of the state, 50 m. s.w. of Toledo, upon the Maumee River, near its juncture with Auglaize, and upon the Maumee and Erie Canal. The Baltimore & Ohio, the Wabash and other railroads pass through the city. It is a manufacturing city; its chief products are auto trucks, engines, steel barrels and shipping cases. There are also extensive machine shops. Defiance College, founded in 1885, is located here. Population in 1920, 8,876.

Defoe, Daniel (1661-1731), an English writer, born in London. Little is known of his early life. He was the son of a butcher and became a tradesman, later serving in the army, in journalism and in politics. His satirical pamphlet against the advocates of the High Church, *The Shortest Way with Dissenters*, led to imprisonment; he was several times tried for treason and libel. While he was pilloried and imprisoned in Newgate, he wrote one of his best poems, *Hymn to the Pillory*. In 1704 he began to publish *The Review*, a periodical which was continued for nine years and in which appeared some of his admirable prose works, including the

realistic *Apparition of One Mrs. Veal*. After he was released he entered the secret service of the government. He produced clever journalistic work, but his best stories were not written until he was about 60 years of age. At one time he enjoyed the advantages of a considerable income, but it is thought that he died practically a homeless wanderer.

Throughout Defoe's life he associated with all sorts of men, and in his writing he was essentially a realist, mingling imaginative touches and reality with the masterly hand of the artist bent on telling the truth and not concerned with artistic effect. His stories are lacking in plot; nevertheless they are important as forerunners of the modern English novel. His masterpiece, *The Surprising Adventures of Robinson Crusoe*, appeared in 1719. The merit of this work is as nearly imperishable as that of any other writing that English literature has produced. Notable additional works are *Captain Singleton*, *Moll Flanders*, *Journal of the Plague Year*, *Colonel Jack*, *Roxana*, *Everybody's Business is Nobody's Business* and *A Plan of English Commerce*.

Degree', a relative term used to express $1/360$ of the circumference of a circle or the angle measured by that arc. This fractional part, chosen by the Babylonians, is founded upon an astronomical error, for it was devised to follow the plan of the solar system when the belief was general that the orbit of the earth was a circle which the earth traversed in a year of 360 days. The arc passed over by the earth in a day of 24 hours, or the angle at the sun subtended by such an arc, was called one degree. From this, $1/360$ th of every circle was said to be a degree. The size then of the degree on the arc of the circle is relative to the size of the circle but the angle subtended is always the same, since the size of the angle does not depend upon the length of the sides. The degree is divided into 60 equal divisions, called minutes, which in turn are also divided into 60 equal divisions called seconds. Degrees, minutes and seconds are expressed by the follow-

ing characters, respectively, °, ', " , which are placed above and at the right of the figure: as $42^{\circ} 29' 30''$ would be read 42 degrees, 29 minutes, 30 seconds. A system called the grade system was suggested by the French to form a part of the metric system. The grade system, though simpler, because its divisions would be in tens, has never come into use because of the enormous labor which it would necessitate in altering mathematical tables of computations.

A degree of longitude is $1/360$ of the circumference of any of the parallels. It is also the distance measured on any of the parallels between two meridians which make an angle of one degree at the poles. A degree of latitude is measured upon the meridians and is calculated by actual measurement. Were the earth a perfect sphere all degrees of latitude would be of the same length since all meridians extend from pole to pole. Since the earth is flattened at the poles the degrees are shorter at the equator than at the poles. Elsewhere in mathematics the term *degree* is used to represent the sum of the exponents of the literal factors; as the expression $a^2 c^3 x^5$ is an expression in the tenth degree. In arithmetic every group of three figures in an expressed number is a degree; as the number 382,196 consists of two degrees. See LATITUDE; LONGITUDE.

De Kalb, Ill., a city of De Kalb Co., 58 m. w. of Chicago, on the Chicago & North Western, the Chicago Great Western and other railroads. Its manufactures include furnaces, hardware specialties, wire, agricultural implements, pianos, shoes, gloves and mittens and dairy products. The town contains several banks and is the seat of the Northern Illinois State Teachers College. Settled about 1838, De Kalb was incorporated in 1877. Population in 1920, 7,871.

De Kalb, Johann. See KALB, JOHANN, BARON DE.

De Koven, (Henry Louis) Reginald (1861-1920), one of the best known of American composers and music critics, born at Middletown, Conn. In 1879 he graduated with highest honors from St

John's College, Oxford, and immediately went to Germany to continue his music study, which he had begun at an early age. He has been a prolific writer of songs and light opera and his music has had unusual popularity. His most familiar songs are *Oh, Promise Me* and *My Love is Like a Red, Red Rose*. Among his most popular operas are *Rob Roy*, *Robin Hood*, *The Knickerbockers*, *The Highway Man* and *Happy Land*.

Delacroix, *Del ah krwah'*, **Ferdinand Victor Eugène** (1799-1863), a French historical painter, leader of the Romantic movement, born at Charenton-Saint Maurice. His father was conspicuous during the Revolution and foreign minister under the Directory. When seven years of age his father died, and he was placed in the Lycée Napoleon, Paris; afterwards, deciding to become a painter, he entered the studio of Baron Guérin. Working at a time when smoothness of surface was the order of the day, he incurred the wrath of contemporary artists and critics with the boldness and dash of his brushwork and the daring originality of his conceptions; and, although he executed government commissions and exhibited in the Salon, among fellow artists he was throughout life an outcast, but always, notwithstanding, enchanted with himself, as he expressed it. He decorated the library of the Luxembourg and that of the Chamber of Deputies, and the ceiling of the gallery of Apollo in the Louvre. Among his noblest works are *Drawing of Lots in the Boat at Sea*, from Byron's *Don Juan*, and *Taking of Constantinople by the Christians*.

Del'ago'a Bay, an arm of the Indian Ocean forming an indentation at the southern extremity of Portuguese East Africa. Three large rivers enter it from the west and south, and upon its northern shore lies the city of Lourenço Marquez, the port of Pretoria, with which it is connected by rail. The bay is 55 m. in its north and south extent and 20 m. wide.

Deland', Margaretta Wade Campbell (1857-), an American novelist, born at Allegheny, Pa. She attended school

at New Rochelle, N. Y., and, previous to her marriage to L. F. Deland, in 1880, taught industrial drawing in New York. In 1886 she published *The Old Garden and Other Verses*, which was followed two years later by her first novel, *John Ward, Preacher*. As a writer of vital fiction she reveals in her work wonderful intuition and creative faculty and a definite grasp of the common material of human life. Her writings include *Old Chester Tales*, *Dr. Lavendar's People*, *The Awakening of Helena Richie* and *The Iron Woman*.

Del'aware, **THE DIAMOND STATE**, one of the Middle Atlantic States, is bounded on the n. by Pennsylvania, on the e. by the Delaware River, Delaware Bay and the Atlantic Ocean and on the s. and w. by Maryland. The northern boundary of the state is in the form of a semicircle whose radius is 12 miles.

SIZE. The state is 96 m. long from north to south and has a breadth varying from 9 to 37 m. The area is 2370 sq. m., of which 405 sq. m. are water. Delaware is the second smallest state in the Union, about one-half the size of Connecticut and less than one-third the size of New Jersey.

POPULATION. In 1920 the population was 223,003. Between 1910 and 1920 there was a gain of 20,681 in population, or 10.2 per cent. There are 99 inhabitants to the square mile and Delaware is the 47th state in population.

SURFACE AND DRAINAGE. Delaware forms a part of the passage between Delaware and Chesapeake bays and lies wholly within the Atlantic Coastal Plain. The northern part of the state is rolling, and between the Brandywine and Christina creeks is a region whose highest elevation near Wilmington forms a hill 438 feet high. This is the highest point within the state. From this point a low ridge extends southward about 12 m. west of the coast and parallel to it. This separates the streams flowing into the Atlantic from those flowing into Delaware Bay. In general the surface of the entire state is low and level. In the south is a cypress swamp having an area

of 70 sq. m. The streams flowing into the Atlantic Ocean are mere brooks, but in the central part of the state there are a few fair-sized creeks flowing into Delaware Bay. In the north the Brandywine and Christiana from Pennsylvania unite to form a broad estuary which constitutes a part of the harbor of Wilmington.

CLIMATE. The state has a warm temperate climate, modified by the great bodies of water which nearly surround it. Spring begins about the first of April and frost seldom occurs until the middle of October. The rainfall ranges from 40 to 45 inches annually, and is heaviest along the coast. The state is free from the severest storms.

AGRICULTURE. The soil is a loam containing clay and, in some localities, sand. Delaware is often called an immense garden and orchard. It has to its credit the largest percentage of tilled land under cultivation of any state in the Union. Cereals are raised in all parts of the state, but fruit and garden vegetables receive the greatest attention. Delaware is one of the leading states in the production of strawberries. Apples and small fruits are also raised in large quantities. Tomatoes and other vegetables are grown for canneries in the state and for the markets in New York, Philadelphia and Buffalo. Corn, wheat and potatoes are the most important field crops. Dairying is also important and is gradually increasing.

MANUFACTURES. Wilmington is the important manufacturing center and has large facilities for the manufacture of nearly all products made from iron and steel. Here are located some of the most extensive shipyards in the country. Railroad cars, street cars, engines, machinery and tools are among the steel products of this city. The manufacture of leather and of textiles are important industries. Canning of fruits and vegetables gives employment to a large number of people. Near Wilmington are the largest powder works in the United States.

TRANSPORTATION AND COMMERCE. Wilmington, Lewes and New Castle have good harbors which are frequented by

ships from all parts of the world. The harbor of Lewes is protected by a breakwater, one of the most extensive works of the sort ever constructed by the National Government. The canal connecting Delaware and Chesapeake bays is a valuable waterway for coastwise trade. The Baltimore & Ohio, the Philadelphia, Baltimore & Washington and the Maryland, Delaware & Virginia are the chief railroad lines within the state. All sections have good transportation facilities.

For the size of the state its commerce is extensive. Fruits, vegetables and other farm products, canned goods and the manufactures from Wilmington are exported. The imports include raw material for manufacture and such articles as cannot be made or raised with profit within the state. Wilmington is the chief commercial center.

GOVERNMENT. The present constitution was adopted in 1897. The governor and other state officers are elected for four years. The governor is eligible for reelection, but cannot serve a third term. The Legislature consists of a Senate of 17 members and a House of Representatives of 35 members. Senators are elected for four years and representatives for two years. The judicial department consists of the Supreme Court with one chief justice, a chancellor and five associate justices, appointed by the governor and confirmed by the Senate.

EDUCATION. The school system is under the management of the state board of education. Schools are provided for both white and colored children, and in cities and towns graded systems with high schools are maintained. The schools of each county are under the supervision of the State Department of Public Instruction, through Rural Supervisors and visiting teachers. Delaware College at Newark has a teacher training department and conducts summer schools for further preparation of teachers. The state also has higher schools and academies.

STATE INSTITUTIONS. The state maintains an asylum for the insane, schools for the deaf, dumb and blind and industrial schools for boys and girls.

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CITIES. The chief cities are Dover, the capital; Wilmington and New Castle.

HISTORY. The state was named from Lord Delaware, who first sailed into the bay in 1611. The Dutch trading post, established near the present Lewes, Del., in 1631, was destroyed by Indians. Thus the Swedes under Peter Minuit, seven years later, at Christina (now Wilmington) made the first permanent settlement. The territory was claimed by both Dutch and Swedes until 1655. Then Stuyvesant from New Amsterdam forced the surrender of Christina. After Delaware passed into the hands of the English (1664), it was finally bought of the Duke of York by William Penn in 1682. He united it with Pennsylvania. Until the Revolutionary War it had the same governor as Pennsylvania and was a part of it. After 1703, however, it had its own Legislature, becoming a distinct province.

Declaring itself independent of Great Britain in 1776, Delaware took an active part in the Revolution. It was the first state to accept the Constitution of the United States (December, 1787). At the outbreak of the Civil War, Delaware, then a wealthy slave state, leaned toward secession. Because of its location, however, it remained in the Union, though ignoring President Lincoln's call for troops. The Thirteenth, Fourteenth and Fifteenth amendments to the Constitution were not ratified until 1901. On account of the political deadlock, the state was without representation in the Senate from 1901 to 1903.

GOVERNORS. Joshua Clayton, 1789-1796; Gunning Bedford, 1796-1797; Daniel Rogers, 1797-1799; Richard Bassett, 1799-1801; James Sykes, 1801-1802; David Hall, 1802-1805; Nathaniel Mitchell, 1805-1808; George Truett, 1808-1811; Joseph Haslett, 1811-1814; Daniel Rodney, 1814-1817; John Clarke, 1817-1820; Henry Malleston, 1820; Jacob Stout, 1820-1821; John Collins, 1821-1822; Caleb Rodney, 1822; Joseph Haslett, 1822-1823; Charles Thomas, 1823-1824; Samuel Paynter, 1824-1827; Charles Polk, 1827-1830; David Haz-

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zard, 1830-1833; Caleb P. Bennett, 1833-1836; Charles Polk, 1836-1837; Cornelius P. Comegys, 1837-1841; William B. Cooper, 1841-1845; Thomas Stockton, 1845-1846; Joseph Maul, 1846; William Temple, 1846-1847; William Tharp, 1847-1851; William H. Ross, 1851-1855; Peter F. Causey, 1855-1859; William Burton, 1859-1863; William Cannon, 1863-1865; Gove Saulsbury, 1865-1871; James Ponder, 1871-1875; John P. Cockran, 1875-1879; John W. Hall, 1879-1883; Charles C. Stockley, 1883-1887; Benjamin T. Biggs, 1887-1891; Robert J. Reynolds, 1891-1895; Joshua H. Marvel, 1895; William T. Watson, 1895-1897; Ebe W. Tunnell, 1897-1901; John Hunn, 1901-1905; Preston Lea, 1905-1909; Simeon S. Pennewill, 1909-1913; Charles R. Miller, 1913-1917; John G. Townsend, 1917-1921. Wm. D. Denney, 1921—.

Delaware, Ohio, the county seat of Delaware Co., 24 m. n. of Columbus, on the Whetstone River and on the Hocking Valley, the N. Y. Central, the Pennsylvania R. R. and the C. D. & M. Traction. The principal industries are tires, rubber goods, chairs, shoes, automobiles, clay products and brass and foundry products. Ohio Wesleyan University, having an enrollment of about 1,600, is located here. About the city are many sulphur and other mineral springs. The population in 1920, United States Census, 8,756.

Delaware, or De La Warr, Thomas West, LORD (1577-1618), an English colonial governor of Virginia, the discoverer of Delaware Bay. At 25 he entered Queen Elizabeth's Privy Council, later belonging to the Council of Virginia in England and coming as governor to Virginia, where he arrived at the lowest point in that colony's history. Having put the colonists on a prosperous footing, Delaware left Virginia, because of ill health, in the spring of 1611, and on the way to the West Indies was driven by a storm into the river which bears his name. In 1618 he again sailed for America, but died on the voyage. He wrote *A True Relation to the Council of Virginia*.

Delaware and Hudson Canal, a canal 108 m. long, completed in 1828, at a cost of about \$6,500,000, which made possible the transportation of coal and other products from Honesdale, Pa., across the Delaware River to the Hudson. Built for boats carrying 25 tons, it was twice enlarged, and finally accommodated boats with a capacity of 150 tons. It was abandoned in 1899, because the company that controlled it had developed upwards of 1000 m. of important railroad, which more than took its place.

Delaware Bay, a bay on the Atlantic coast of the United States lying between the states of Delaware and New Jersey. It is about 40 m. long, its greatest width being about 25 m. and its depth varying from 30 to 60 ft. The Delaware breakwater at Cape Henlopen, constructed by the United States Government at a cost of about \$3,000,000, affords shelter for vessels in its large and safe harbor that is from 24 to 35 ft. deep. At the entrance to the bay and also within it, government lighthouses are maintained. Extensive coast and foreign shipping is carried on to and from Wilmington, Chester and Philadelphia.

Delaware, University of, at Newark, Delaware. Founded as New Ark College in 1833. The name was later changed to Delaware College. Closed from 1859-1869. Re-opened in 1870, having been designated as beneficiary under the Morrill Land Grant Act of 1862. In 1913 the Women's College, separate in buildings, class rooms, and instruction was established, affiliated with Delaware College. In 1921 by Act of the General Assembly of the State, Delaware College and the Women's College were combined under the single title of the University of Delaware. Courses are offered in Arts and Sciences, Engineering, Agriculture, Home Economics, and Education, and Vocational Rehabilitation for Federal ex-service men. Total endowment and educational plant of the University is estimated at \$1,875,000.

Delaware River, a large river of eastern United States, rising in Delaware County, N. Y., on the western slopes of

the Catskills in two branches known as the East Branch, or Pepacton, and the West Branch, or Coquago. The two branches flow in a southwesterly direction and meet at Hancock near the Pennsylvania border. Thence the river forms the boundary between southern New York and Pennsylvania and New Jersey and Pennsylvania. Its course is very irregular, flowing sometimes to the southeast and again, deflected by obstructing mountains, to the southwest. The river passes through the Kittatinny Mountains in the famous Delaware Water Gap, a narrow gorge whose precipitous sides rise from 1000 to 1200 ft. above the water's course. It is a region of unusual picturesqueness and is interesting to geologists for its glacial markings. At Chester, Pa., near the northern boundary of Delaware, the river broadens to an estuary which from Delaware City south is known as Delaware Bay. The bay is 11 m. wide at its entrance and is fully 60 m. in length. The river alone is 375 m. long and the tide ascends it for 130 m., or to the city of Trenton, N. J. The Delaware is navigable for the largest boats to Philadelphia, where it is nearly a mile wide and where it is last crossed by bridges. The cities of Philadelphia, Camden, Chester, Trenton, Easton, Newcastle, Burlington and Bristol lie upon its banks. Its chief tributaries are the Schuylkill, the Lehigh, the Brandywine and the Rancocas.

Delaware Water Gap. See DELAWARE RIVER.

Delcassé, *Del" ka" sa'*, Théophile (1852-), a French statesman, born at Pamiers. He became known by his able articles on foreign politics, which were published in various French journals. Having served several times in the Chamber of Deputies, he became minister of the colonies in 1894, in which capacity he greatly furthered economic progress in French foreign possessions. From 1898 to 1905 he was foreign minister. Meanwhile, he was mediator between the United States and Spain, and took part in the settlement of affairs after the Boxer uprising in China, and in

1904 was instrumental in improving the Anglo-French agreement.

Del'hi, the capital of India, and the ancient capital of the Mogul Empire, situated on the Jumna River, about 954 m. n.w. of Calcutta. A stone wall 30 ft. high surrounds the city on three sides, with the famous Kashmir gate in the north wall. The imperial palace includes the Hall of Public Audience and the Hall of Private Audience, the interiors of which are marvels of architectural beauty. In the former stood the Peacock Throne, with feet of gold and bars with crosses set with rubies, diamonds and pearls. Other features of interest are the "silver street," once known as the richest in the world, the Great Mosque, the Black Mosque, the Pearl Mosque, several tombs, the Kutb Minar, or the most perfect tower, the Residency, the museum, library and a Protestant church. Because of its central position Delhi is a trade center of importance. The manufactures include glazed pottery, jewelry, wood carving, gold and silver filigree work, embroidery, muslins and shawls. Since the end of the Mutiny of 1857 the city has advanced materially in commercial importance. Population in 1901, 208,575.

Delir'ium Tre'mens, an abnormal condition of the brain caused by the excessive and protracted use of alcoholic drinks. Its symptoms are delirium and trembling. The tremor comes upon the patient only at intervals, and is sometimes only slightly perceptible, if at all, while the delirium is a constant symptom, sometimes throwing the patient into paroxysms of terror, in which he imagines he sees horrible and grotesque objects. The disease is peculiar to drunkards.

Delphi, Del' fi, Oracle of. See GREECE, subhead *Oracles*.

Del'ta, the alluvial plain at the mouth of a river. The name originally applied by the Greeks to the triangular plain at the mouth of the Nile because of its resemblance to the Greek letter *delta*, is now applied to any deposit of land waste laid down by a river at its mouth. Deltas are usually formed by rivers which

empty into lakes or quiet inland seas. When a river empties directly into the ocean, the silt brought down from the land and held in suspension is washed out to sea by violent action of the waves and distributed over the ocean bed. But when the river's current is checked by the gentle inflow from some such body as the Mediterranean or the Gulf of Mexico, the salt water acts as a precipitate, causing the particles held in suspension to settle to the bottom. This sediment blocks the river's mouth, often dividing the stream into several branches. On the Mississippi these distributaries, constituting the river's several mouths, are called bayous. Sometimes enormous tracts of land are built up by river deposits. The Mississippi has built up a fan-shaped land mass beyond the original shore line, which extends 100 m. into the Gulf. Other great deltas are those of the Brahmaputra, Mackenzie, Po, Ganges, Nile and Hoangho. Deltas are extremely fertile and are valuable for agricultural purposes, but are in constant danger of floods and overflows.

De Mille, De mil', James (1837-1880), a Canadian author, born at St. John, New Brunswick. In 1854 he graduated at Brown University, was professor of classics in Acadia College in Wolfville, Nova Scotia, from 1860 to 1865, and from the latter date until his death was professor of history and rhetoric in Dalhousie College, Halifax, Nova Scotia. His writings occupy an important place in Canadian literature, and embrace *Lost in the Fog*, *The Arkansas Ranger*, *The Lady of the Ice*, *Andy O'Hara*, *The Soldier and the Spy*, *The American Baron*, *The Living Link* and *A Castle in Spain*.

Democ'racy. See GOVERNMENT, subhead *Democracy*.

Democrat'ic Donkey, a caricature used by opponents to represent the Democratic Party. Thomas Nast, the famous cartoonist, originated this when in the employ of *Harper's Weekly*, before the Civil War. See DEMOCRATIC ROOSTER; NAST, THOMAS.

Democratic Party. See **POLITICAL PARTIES IN THE UNITED STATES**, subhead *Democratic Party*.

Democratic Rooster, the pictorial representation of the early Democratic Party. Before the administration of Andrew Jackson the Democrats had adopted no emblem, but during his presidency the cry "Turn the rascals out" led to the adoption of a picture of a hickory pole with a broom attached. A man from Indiana by the name of Chapman, however, originated the present emblem. He was a boastful talker, and in political correspondence was urged by a friend to continue to "crow." This remark became public, and in the campaign of 1844 the spirit of the Chapman propensity to crow was symbolized in the rooster which the Democratic Party adopted as its emblem of victory.

Democritus (about 460-about 370 B. C.), an early Greek philosopher, born at Abdera, an Ionian colony in Thrace. The son of wealthy parents, he traveled extensively in the East, where he studied and collected the writings of other philosophers. He enjoyed the instruction of the Greek philosopher Leucippus, the first of the Atomists, whose system he further developed. No other philosopher before Aristotle possessed such varied attainments as did Democritus. He was a man of modesty and simplicity, and lived to a very advanced age. Democritus belongs to the early pre-Socratic period of philosophy, which was seeking some principle for the explanation of nature. This he found in the theory of atoms and space. The atoms, unlimited in number, are material particles, alike in quality, but differing in size, form and weight. The world is to be explained by the different motions and combinations of these atomistic particles. In ethics Democritus set happiness as the chief aim. His theory was made the basis of the system of Epicurus. See **EPICUREANISM**.

De Morgan, William Frend (1839-1917), an English author, born in London. In 1859 he studied at the Royal Academy, having adopted art as a pro-

fession; after 1864 he was engaged in working with stained glassware, and later turned his attention to ceramic work. Since 1904 he has devoted his time to fiction writing, and is extraordinary in view of the fact that he took up the literary profession with such marked success at so late a period of his life. His delightful, rambling stories are suggestive of Dickens, and include *Joseph Vance*, *Alice-for-Short*, *An Affair of Dishonour*, *Somehow Good* and *It Never Can Happen Again*.

Demosthenes, *De mos' the neez*, (about 384-322 B. C.), an Athenian orator and statesman. He studied rhetoric to overcome defects of speech and manner and read Thucydides to obtain clearness and vigor of style. He studied law and gained considerable reputation as a constitutional lawyer. From 346-340 B. C. Demosthenes formed a party against the aggressions of Philip of Macedon. He had long foreseen Philip's plans, but could not gain the attention of his countrymen until it was too late. His greatest speeches were called *Philippics*, because of their bitter denunciation of the Macedonian ruler. War began in 340 and ended in the crushing defeat at Chæronea in 338. Demosthenes still held the confidence of the Athenians and was presented with a golden crown as a public benefactor. His enemies tried to use this as a pretext for his political overthrow, but they were silenced by Demosthenes in his great speech, *On the Crown*.

Demosthenes was accused in 324 of taking State money. He was condemned and escaped from prison. The next year Alexander died and Demosthenes returned to urge the Athenians to an unsuccessful revolt against Antipater. The Athenians were defeated at the Battle of Crannon and Demosthenes fled to Calauria. To escape Macedonian vengeance he took poison in 322. Demosthenes stands at the head of the world's greatest orators. His orations are simple in style, earnest, elevated and pure in tone, and their finished perfection in rhythm and choice of words have made them the

admiration of all ages. Plutarch has written his life. Consult Bohn's edition for an English translation.

Demurr'er, in law, a stop to the proceedings of an action because of some difficulty which must be settled by the judge before the proceedings can go on. A demurrer accepts the facts stated as true, but alleges that in accordance with the laws of the state they are not sufficient to be cause for an action. A specific demurrer states the particular difficulty by which the proceedings are stopped. A general demurrer is one not specifying an objection.

Den'ison, Tex., a city of Grayson Co., 72 m. n.e. of Dallas, on the Texas & Pacific, the Missouri, Kansas & Texas, the Houston & Texas Central, the St. Louis & San Francisco, the Missouri, Oklahoma & Gulf and other railroads. The city is an important railway center and a wholesale and jobbing market for the upper Red River Valley. Among the leading articles of trade are poultry, hogs, vegetables, fruits, grain and cotton. The principal manufactured articles are cotton-mill products, cotton-seed oil, flour, woodenware, machinery and foundry products and dairy goods. Chief among the noteworthy buildings are St. Xavier's Academy, Federal Building, Denison High School, Union Station and Missouri, Kansas & Texas shops. Denison was settled in 1872 and incorporated the same year. It is administered under a charter of 1905. Population in 1920, 17,065.

Den'mark, a kingdom of Europe, the smallest of the three Scandinavian kingdoms, lying between 54° 33' and 57° 45' north latitude and between 8° 4' and 12° 45' east longitude. It comprises the Jutland Peninsula, the Danish Archipelago, the Island of Bornholm and the Faroe Islands, a total area of 15,385 sq. m., or almost twice the size of the State of Massachusetts. The kingdom is almost wholly surrounded by the sea.

SURFACE AND RIVERS. The surface of the country is uniformly low, and the coasts are bordered by dunes and sand bars, behind which are large lagoons, or

enclosed bays, which are too shallow to do service as harbors. A water parting consisting of a ridge of hills traversing central Jutland turns the waters of the Stor, the Lönborg and the Varde into the North Sea and the Guden into the Cattegat. The Guden, 100 m. in length, is the largest river of Denmark. The largest islands are Zealand and Fünen.

CLIMATE. The climate of Denmark resembles that of eastern Scotland, but Denmark has greater extremes of temperature both in winter and in summer. Heavy rains and mists are frequent, and the Sound and other channels are frequently filled with drifting ice in winter. The climate of the islands is generally warmer than that of Jutland.

AGRICULTURE AND MANUFACTURES. There are no metallic ores in the country, and aside from the peat and the poor coal which are found, Denmark is preeminently an agricultural country. About 39 per cent of the inhabitants are engaged in agricultural pursuits, and of the total area about 35 per cent represents arable land, 24 per cent is under forests and 41 per cent is pasture. The leading crops are oats, rye, barley, wheat, potatoes and beet roots. Stock raising is prominent among the industries, and dairy farming, carried on by a general cooperative plan, is highly developed. The manufactures are not on a large scale, and the products are, in the main, furniture, foodstuffs, wearing apparel and metal products. There is some iron smelting and manufacture of pottery and machinery. The principal plants are in Copenhagen.

TRANSPORTATION AND COMMERCE. The transportation is carried on mainly by waterways, as all the large cities are on navigable rivers or on the coast. The steamboats run constantly between the islands. A railway mileage of over 2300 m. is maintained; of this the State owns the larger part. The first railway within the confines of the country was opened in 1847. The imports of Denmark consist principally of animal and dairy products, cereals, coal, hardware, groceries, textiles, and metals; the exports are almost

wholly animal and dairy products. The exports are to Great Britain, Germany, Sweden and Russia, and the trade with the United States has within recent years become very significant.

INHABITANTS. The Danes are a Teutonic people belonging to the Scandinavian group. The type is fairly tall, with light or chestnut hair, blue eyes and a generally fair complexion. The Danish language closely resembles the Swedish and the Norwegian, and, since the separation of Denmark and Norway, the Danish has been the literary language of Norway.

LITERATURE. See **LITERATURE**, sub-head *Scandinavian Literature*.

GOVERNMENT AND EDUCATION. The government of Denmark is a constitutional monarchy, based upon the constitution of 1849, revised in 1866. A king, together with the National Legislature, or Rigsdag, exercises the legislative power. This National Legislature consists of an upper house, or Landsting, and a popular chamber, or Folkething. There are 66 members in the upper house, and 114 deputies (one for every 16,000 of the population) in the popular chamber. Twelve members of the upper house are appointed for life by the Crown; the rest are elected by representatives of the highest taxpayers and of the people at large, to serve for a term of eight years. The members of the lower house are elected by direct male suffrage for a period of three years. The eight ministers who have the executive power preside over the departments of foreign affairs, finance, interior, justice, war, navy, public instruction and worship, and agriculture.

The established State Church is the Lutheran, but all creeds are tolerated.

EDUCATION. Elementary education is free and compulsory, and the country enjoys an absence of a high degree of illiteracy. The high schools are mostly private; there are several agricultural and other technical schools. The University of Denmark is situated at Copenhagen and was founded in 1479; the Royal Academy of Art was founded in 1754.

COLONIES AND CHIEF CITIES. The colonial possessions of Denmark have a total area of 86,634 sq. m. They include Iceland, a part of Greenland and the Danish West Indies. The principal cities are Copenhagen (the capital), Aarhus, Aalborg, Horsens, Odense, Fredericia and Randers.

HISTORY. The early history of Denmark is lost in the legendary voyages and brave deeds of Saga heroes. The early people were Cimbri and were overcome by the invading Angles, Saxons and Jutes. When these tribes made their invasions into England, the Danes, living on the neighboring island, Zealand, crossed over to the Continent. The authentic history of the Danes begins about 800 A. D. We hear of the submission of the Danish ruler, Sigfrid, to Charlemagne, in 782. Soon followed the voyages of the Danes upon the coast of France, ending only with the establishment of their chief, Rollo, in Normandy in 911.

For a short time Canute the Great held Denmark, Sweden and Norway under one rule and even extended his sway over England. After his death his empire fell and troublous times followed until the reigns of Waldemar I and Waldemar II. Under the latter the conquests were extended so far that the Baltic was almost an inland Danish Sea. Then followed a period of decline until a part of the conquests were regained by Waldemar IV. He died in 1375 and was followed by his famous daughter, Margaret, who was the widow of Haakon VI of Norway. She was able to effect a union of the two countries and in 1397 united Sweden by the Union of Kalmar, ruling so wisely that the three countries were in harmony. Her work was largely undone by her successor Eric. In 1448 the Danes elected Christian of Oldenburg their king. He founded the Oldenburg dynasty, which continued to rule until 1863. In 1523 Gustavus Vasa, who had led a successful rebellion in Sweden, was made King of Sweden. From this time the country was separated from Denmark.

The Reformation made progress in the country under Christian III (1536-1559). Christian IV was defeated in the Thirty Years' War and then wisely turned to the development of his kingdom. His reforms were checked by his selfish nobles, and it was due to them that all Danish possessions in Sweden were lost during his reign. In 1802 the English fleet bombarded Copenhagen, as Denmark had joined Russia against England. The country recovered, but in 1807 the British suspected that Denmark would aid Napoleon, and demanded that the entire Danish fleet be given up to her, promising to restore it after peace was established. Upon a refusal Copenhagen was again bombarded and the fleet was given up. This treatment drove the Danes to ally themselves with Napoleon until 1813.

By the Treaty of Vienna, 1814, Denmark was forced to give up Norway to Sweden. It was further shorn of territory when the troubles with its German subjects led to the intervention of Prussia and Austria and the loss of Schleswig and Holstein in 1864. Christian IX came to the throne in 1863, and since 1864 the country has been at peace and has been prosperous. One of the chief events of his reign was the granting of constitutional government to Iceland. Christian IX died in 1906 and was succeeded by his son, Frederick VIII. In 1912 Christian X ascended the throne. Population in 1916, 2,940,979.

Den'tistry, the art of treating diseases of the teeth and replacing those which are extracted. It is a profession which has changed greatly since its beginning; originally it dealt chiefly with the extraction of teeth; now its chief concern is the prevention of diseases of the teeth and the saving of those teeth which are attacked by disease. It recognizes that by keeping the teeth thoroughly clean they may be preserved throughout the lifetime.

Dentistry is now generally divided into two departments, dental surgery and mechanical dentistry. The first refers to the treatment of diseases of the teeth

and gums, the scaling, or cleaning, of the teeth, the correction of crowded gums, the killing of the nerves where it is found necessary, the filling of cavities and the extraction of those teeth too diseased to be saved. Mechanical dentistry concerns itself with the making and placing of teeth either singly or in sets. Such teeth are now generally manufactured in quantities and are purchased by dentists as needed. Electricity, anæsthetics and X rays are all used in modern dental work, and have made the treatment much more rapid and less painful. Crown work refers to the capping of teeth which are too badly broken to be filled, and bridge work is the insertion of single teeth held in place by means of bands and "bridges."

The Baltimore College of Dental Surgery, established in 1839, was the first dental school of the United States. There are now 55 such schools enrolling fully 7000 students. *The American Journal of Dental Surgery* and the *Dental Cosmos* are the most authoritative dental magazines, and the American Dental Association is an important organization of members of the profession. Aside from this, the various states have their own local associations.

Den'ver, Colo., capital city of the state and commercial metropolis of the Rocky Mountain region, 538 m. w. of Omaha, 1047 m. w. of Chicago and 1409 m. n.e. of Los Angeles, at the junction of the Platte River and Cherry Creek and on the Atchison, Topeka & Santa Fe, the Chicago, Burlington & Quincy, the Union Pacific, the Denver & Rio Grande, the Chicago, Rock Island & Pacific, the Denver, Colorado & Southern and other railroad systems and their branches. Denver is the gateway of the wonderful mountain scenery of Colorado, and for many years it has enjoyed the reputation of being a great tourist and convention city. The altitude is one mile above sea level, and from any elevation a view of the Rocky Mountain foothills and snow-capped peaks can be had for a distance of 200 m. north and south. The city is the center of a rich agricultural country, watered by irrigation, and is

the recognized jobbing center and wholesale market for a large territory. Denver is an important smelting center, being in close proximity to the great mining region of Colorado, which produces gold, silver, copper and lead. Coal is also found in abundance. The city has an area of 60 sq. m. and contains about 200 m. of street-railroad track, with a universal transfer system. Interurban lines reach Boulder, Eldorado Springs, Golden and Leyden, passing through the towns of Louisville, Marshall and Superior. Electric service is maintained with many near-by popular resorts.

PARKS AND BOULEVARDS. Denver has 35 parks containing a total of 1321 acres. City Park is the largest of the park system, with an area of 320 acres. It has two lakes, an extensive zoological garden, an aviary and Museum of Natural History. In the center of the lake is an electric fountain which cost \$20,000. The plaza, or civic center, faces the capitol grounds. The city has over 60 m. of boulevards and parkways and about 240 m. of paved, shaded and graded streets and handsome residences. Many palatial homes surrounded by beautiful lawns are about the Capitol Hill residence district. The Welcome Arch is located at the foot of 17th Street, in front of the Union Station. It was erected by private subscription at a cost of \$22,500 and presented to the city in 1906. Denver is the headquarters for the Department of the Colorado, United States army.

PUBLIC BUILDINGS. The most imposing structure of the city is the capitol on the west slope of Capitol Hill. This building is constructed of Colorado granite and cost \$2,800,000 exclusive of the site. The grounds are now valued at \$1,000,000. The structure is finished inside with bronze and Colorado onyx. A Colorado State Museum has been erected at a cost of \$250,000 to house the State Bureau of Mines, the Cliff Dwellers and the War Relic museums and the State Bureau of Agriculture and Horticulture. Other noteworthy buildings include the United States Mint, which was opened in 1906, an Auditorium, city hall,

Chamber of Commerce, county courthouse and Federal Building, state armory, a public library, Y. M. C. A. and Y. W. C. A. buildings, the Athletic and Denver Club buildings, about 76 fine hotels, 27 theaters, 38 banks, substantial business blocks and over 240 churches. The new cathedrals include St. John's (Episcopal) and the Catholic.

INSTITUTIONS. Among the noteworthy educational institutions are the University of Denver, including schools of Art, Law, Dentistry, Commerce and Medicine, Westminster University, Wolcott School, College of the Sacred Heart, Loretto Academy, St. Mary's Academy, Collegiate School for Boys, several conservatories, academies of art and business colleges, six high schools, 5 junior high schools, about 62 grade schools and many parochial schools. The benevolent and charitable institutions include the City and County, the Steele, the Emergency, the Mercy, the Park Avenue, St. Joseph's, St. Luke's, St. Anthony's, Presbyterian and the Metropolitan hospitals; Adams, Memorial, Oakes, North Side, Mount St. Vincent's and Christian homes; the Agnes Memorial, Mt. Airy and Sunlight sanitariums; State Home for Dependent Children, Florence Crittenden Home and Jewish Relief Home.

INDUSTRIES. Denver is the leading live-stock market west of the Missouri River, the stockyards covering 150 acres of ground. A building for the exhibition of live stock is located at the stockyards and cost \$250,000. The city has five large meat-packing houses and 12 slaughter houses. In the suburbs of the city a large acreage is used for market gardening and fruit raising. Denver's smelting industry is of great importance and the city has large wholesale interests in dry goods and groceries. The city contains flour and grist mills, car-construction and repair shops, foundries and machine shops, and large plants for manufacturing mining machinery.

CHAMBER OF COMMERCE. The Denver Civic and Commercial Association is the leading commercial body of the state. It

is composed of representative business and professional men, and has its headquarters in its own six-story building in Denver. Visitors to the city are cordially invited to visit the Chamber, and the officers are always ready to answer promptly correspondence regarding Denver and Colorado, and will send literature upon application.

HISTORY. The first settlement was made by a party of gold seekers in 1858 and the place called Auraria. An unsuccessful attempt was made to organize the town of St. Charles on the east side of Cherry Creek, in the territory now embraced by East Denver, in 1858. On Nov. 17, 1859, the town of Denver was incorporated on the site of St. Charles and named after Gen. James W. Denver, governor of Kansas, which then included Colorado. Later the town of Auraria became a part of the city and is known as West Denver. The city has a form of government which in effect makes the Mayor an elective manager, assisted by an elective council of nine members. This charter was adopted in 1916. Population in 1920, 256,491.

Denver, University of, at Denver, Colorado (1864). This is a coeducational institution, established by the Methodist Episcopal Church under the name of Colorado Seminary. The Seminary developed into the University of Denver in 1880.

The departments are College of Liberal Arts, Graduate School, Extension College, Summer School, and Schools of Law, Dentistry, Pharmacy, and Commerce.

It is the Pioneer School of Higher Learning in the Rocky Mountain country. The teaching force numbers about 125 and the enrollment of students is around 1500.

Department, one of the chief territorial and administrative divisions of France, corresponding in some measure to a state in the United States or a province in Canada. This division was effected in 1789. There are now 83 departments.

DePauw University, Greencastle, Indiana. Founded by the Methodist

Episcopal Church in 1837. Includes departments of Liberal Arts, Music Education, Domestic Science, and Electrical Engineering. There is an enrollment of about 950 students. The university possesses a fine library of 49,000 volumes, has sixteen buildings, a plant endowment of \$1,000,000 and a productive one of \$2,000,000.

Depew', Chauncey Mitchell (1834-), an American lawyer and orator, born in Peekskill, N. Y. He graduated at Yale in 1856, studied law and began practice in his native town. He served in the Legislature in 1861-62, and in 1863 was elected secretary of state for New York. He rose rapidly as a railroad lawyer, in 1866 becoming attorney for the Harlem Railroad; in 1875 general counsel for the Vanderbilt system; in 1882 second vice-president of the New York Central and Hudson River Railroad; in 1885 its president; and in 1898 succeeding Cornelius Vanderbilt as president of the entire Vanderbilt system. In 1899 Mr. Depew was elected to the United States Senate, being reelected in 1905.

De Quin'cey, Thomas (1785-1859), an English author, born in Manchester. He was educated in Bath and Manchester and at Oxford. At the age of 15 he conversed readily in Greek, and in the university he was distinguished as a Latin and Greek scholar, as well as a student of German metaphysics and English literature. While at Oxford he acquired the opium habit, which was the curse of his life. From 1809 to 1821 he lived in Grasmere, in intimate association with Wordsworth, Coleridge and Southey. Returning to London, he became a regular contributor to *Blackwood's Magazine* and the *London Magazine*. He lived in and near Edinburgh from 1828 until his death. In his writings he dealt with questions of politics, theology, ethics, philosophy, history and criticism. His best work, however, was his imaginative prose. The *Confessions of an Opium-Eater* is a marvel of dream-painting. His extraordinary style and powers of imagination are also disclosed

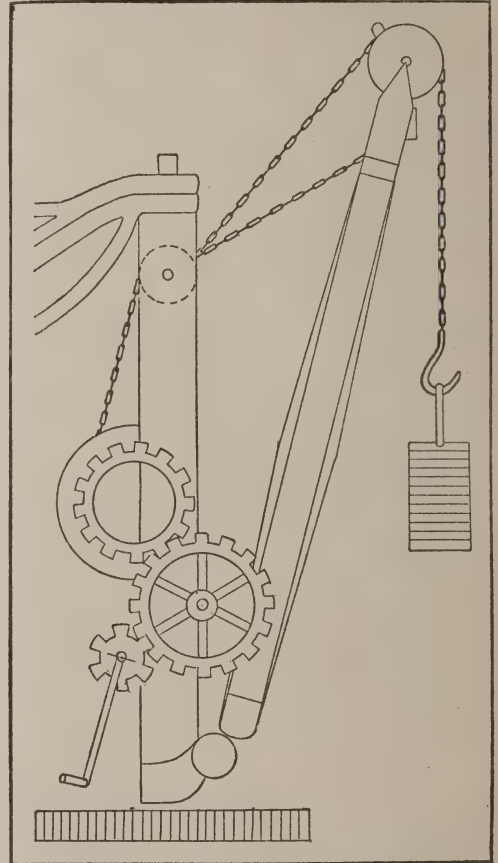
in the shorter essays, *Murder Considered as One of the Fine Arts*, *The English Mail Coach*, *Suspiria de Profundis* and *Joan of Arc*. De Quincey was a leading prose writer of the Romantic Period.

Der'by, Conn., a city of New Haven Co., 9 m. w. of New Haven, on the Housatonic River, at the mouth of the Naugatuck, and on the New York, New Haven & Hartford Railroad. It is an important manufacturing city and has abundant water power from the two rivers. A bridge across the Naugatuck connects Derby with the city of Ansonia. There are extensive manufactories of brass and iron goods, paper, corsets, combs, keys, ammunition, guns, pianos, organs, typewriters, woolens and spectacles. Among the many points of interest in the vicinity are Lake Housatonic, Indian Well and Sentinel Hill. The town was settled in 1646 and was known as Paugassett until it was incorporated in 1675 and named Derby from the English town of the same name. Until 1889 Ansonia was included within its limits. The town of Derby and the borough of Birmingham were united in 1893 and formed the city of Derby. Population in 1920, 11,238.

Derby, Dahr' by, **Frederick Arthur Stanley**, SIXTEENTH EARL OF (1841-1908), an English statesman. After studying at Eton College, Derby entered the army in 1858. He was elected to Parliament from Preston in 1865, became lord of the admiralty three years later, financial secretary for war in 1874 and secretary for the treasury in 1877. In 1886 he was made a peer as Baron Stanley of Preston. After serving as secretary for the colonies, he was governor-general of Canada from 1888 to 1893. In these positions he won distinction and received high honors from the government.

Der'rick, a mechanical apparatus for lifting and transporting heavy weights, such as stone in a quarry. Derricks may be divided into two classes, guy derricks and stiff-leg derricks. A guy derrick consists of a tall mast revolving on a pin and a socket, and is anchored and braced

in an upright position by guy ropes extending from the top of the mast to the ground. A boom is hinged near the bottom of the mast and is so constructed that the upper end may be raised or lowered by suitable block and tackle, in which the rope works through sheaves fastened near the top of the mast and also at the outer end of the boom. At



DERRICK

the bottom of the mast is a drum with a system of wheels, or these may be contained in a hoisting device operated by steam or electric power and located some distance away. The engine raises and lowers the weights, and also swings the boom in the direction desired.

Stiff-leg derricks have no mast, and the upright post that is employed instead is sustained in position by two or

more upright timbers acting as braces. The boom is swung in a manner similar to that of a guy derrick, and the apparatus is practically identical. Derricks are used in erecting buildings of stone and steel construction and for a large variety of purposes. See CRANE; WELL BORING.

Der'vish (poor), among the Moham-medans a zealot set aside by asceticism. Some live in monasteries, some are itinerants, while others are engaged in menial or arduous occupations. Common people respect them highly and bestow alms upon the mendicants, who carry wooden bowls for this purpose. Moreover, they accord them powers of divination and ask their interpretation of dreams and their aid in curing diseases. Their devotion expresses itself in dancings or in whirlings and in shriekings of the name *Allah*. This latter devotion is accompanied by writhings of the body, which culminate in a frenzy and often in prostration and in foaming at the mouth.

Descartes, Da" kahrt', René (1596-1650), the founder of modern philosophy, born at La Haye, France. At the age of eight he was sent to the Jesuit College at La Flèche, where he showed unusual intellectual ability and made rapid progress in his studies. He became dissatisfied with the doctrine and method of the philosophy of the Middle Ages; and determined when he left college to study only himself and the world of nature and life around him. In his 21st year he entered the army, where he served for four years. After further travel he finally settled in Holland in 1629. Here he remained for 20 years and worked out his reconstruction of philosophy, incidentally becoming involved in theological controversies. In 1649 he went to Sweden, at the invitation of Queen Christina, and died there a few months later.

Descartes marks the beginning of a new era in philosophy. He was not satisfied with establishing a new method, as was Bacon, but affirmed a new philosophic principle. Claiming that all

knowledge in his day rested upon an insecure foundation, he asserted that the way to begin was to doubt everything that could be doubted. But there is one thing that cannot be doubted, namely, myself, who does the doubting. Hence he begins with the proposition: I think, therefore, I am (*cogito ergo sum*). From this principle of self-conscious existence he works out his philosophical system. Whatever is as clearly thought as is self-consciousness must be true. Such ideas are classified as innate. Among the first of such certainties is that of a perfect God. These innate ideas, however, have no intrinsic connection with external matter, and consequently a dualism appears in the system of Descartes, the solution of which determines the course of the further development of philosophy. Descartes also accomplished lasting results in physics and pure mathematics, especially by his invention of analytic geometry, which marked him as the foremost mathematician of his time. His chief writings include *Essays*, *Geometry*, *Discourses on the Method of Reasoning* and *Principles of Philosophy*. See DEDUCTIVE METHOD.

Descent', in law, the transmission of the title to real estate, to the heirs of the proprietor when he dies without a will. The general rule in the United States is that the real estate descends to the children and grandchildren in the line of lineal descent; if there are no heirs in this line, it descends to parents; if they are not living, then to collaterals, that is, brothers and cousins. Each state, however, has its own laws governing descent and these differ in minor points, so that one should study the law in any state in which he desires to obtain an exact knowledge of the conditions. According to the old English law, the real estate descended to the oldest son who was living, provided an older son had not died leaving a son to survive him. If all the sons died without leaving any children, the real estate descended equally to the daughters.

Desert, Des' ert, an area of considerable extent which is almost, if not

quite, destitute of plant and animal life. These arid wastes may be regions of perpetual snow and ice, such as are found in high latitudes and at great elevations, or they may be surfaces of barren rock. Ordinarily when we speak of deserts we mean those vast barren tracts lying within the tropics and the temperate zones which receive scanty or no rainfall and which are, in consequence, without life. The principal regions of the globe so affected form a belt extending across northern Africa, through Arabia, Persia, Turkestan, Sungaria and Mongolia, nearly to the Pacific. This belt is shifted far to the north in Asia by the mountain ranges extending east and west. Extensive desert areas occur in central Australia, while the Kalahari Desert of southern Africa, the Colorado Desert of North America and the Altacama Desert of Chile are of more limited extent.

The boundaries of deserts are not well defined, and the condition of barrenness is gradually produced. The dryness of these regions is due to three chief causes: to mountains enclosing the dry area and intercepting rain-bearing clouds; to distance from the ocean, in which case all the moisture carried from the sea is precipitated before reaching the arid area; to warm winds which dry the region but which bring no rain. The crossing of large deserts, such as the Sahara, is made possible by the occasional occurrence in the desert of natural springs, which give rise to a patch of vegetation and form an oasis. Desert lands which have been reclaimed by irrigation are exceedingly productive. See IRRIGATION.

Des Moines, De Moin', Iowa, a city, port of entry, county seat of Polk Co. and capital of the state, 138 m. n.e. of Omaha, Neb., and 340 m. w. of Chicago, on the Des Moines River, at the mouth of the Raccoon River, and on the Chicago, Burlington & Quincy, the Chicago and North Western, the Chicago, Rock Island & Pacific, the Chicago Great Western, the Wabash, the Chicago, Milwaukee & St. Paul, the Minneapolis & St. Louis and other railroads. Des Moines is the largest city in the state

and has large shipping and manufacturing interests. The city is situated in one of the richest agricultural and bituminous coal regions of the state, and coal mining is conducted within the corporate limits of the city. The rivers are here spanned by a number of bridges, and several interurban electric lines also connect with the near-by towns and cities.

PARKS AND BOULEVARDS. Des Moines covers an area of 54 sq. m. and contains about 17 public parks with a total area of 715 acres, Waveland, Union and Grand View parks being among the largest. The streets are wide, well lighted and paved and the residential portions of the city are shaded by great forest trees. Grand Avenue runs along the bluff on the north bank of the 'Coon River and has many elegant residences. Kingman Boulevard is also one of the attractive streets of the city. The Iowa State Fair Grounds of 600 acres are located here and a state fair is held annually.

PUBLIC BUILDINGS. The most noteworthy structure is the state capitol, erected at a cost of \$3,000,000. This building contains the celebrated painting of *Westward* by Edwin Blashfield. Other important buildings include the Iowa State Historical Building, Federal Building, courthouse, a state arsenal, Union Depot, coliseum, city hall, the Elks, Hyperion and Des Moines clubhouses, banks, theaters and substantial business blocks. There are about 94 churches, most of them of handsome architectural design and interior beauty.

INSTITUTIONS. The city is the seat of Des Moines College (Baptist), coeducational, founded in 1865; Drake University, founded by the Disciples of Christ in 1881 but now nonsectarian; Danish Lutheran College, Highland Park Normal College (Presbyterian), which was recently purchased by and combined with Des Moines College, a new high school costing \$500,000, public and parochial schools, kindergartens, Cumming School of Art, a commercial college, a college of osteopathy and the city, state, historical and Drake-Carnegie libraries. Among

the other institutions are a home for the aged and several hospitals.

INDUSTRIES. As a manufacturing center Des Moines is of considerable prominence. The principal industries comprise pork packing and coal mining and shipping. The city contains foundries and machine shops, flour and grist mills, creameries, planing mills, Portland-cement works, bridge and iron works, publishing houses and manufactories of furniture, pottery, brick and tile, proprietary medicines, cotton and woolen goods, skirts, gloves, carriages, electrical appliances, farm implements, brass goods, typewriters, wall paper, starch, bicycles, scales, gas engines, boilers, caskets, hosiery and glue. The city is also an important center for the insurance business.

HISTORY. The site of Des Moines was first opened to settlement by the whites in 1843. The place was incorporated as a town in 1851 and chartered as a city in 1857. A fort was reestablished here in 1900 by act of Congress and named Ft. Des Moines. This fort is occupied by a full regiment of cavalry. A new city charter was adopted in 1907 embodying what has become known as the Des Moines plan of municipal, or commission, form of government. The initiative, referendum and recall are combined with government by commission in the Des Moines plan. Population in 1920, U. S. Census, 126,468.

Des Moines River, a river of central United States rising in southwestern Minnesota and flowing southeast through Iowa into the Mississippi River at the southeastern angle of the state. The river is 450 m. in length and traverses a fertile agricultural country of remarkable beauty. The cities of Fort Dodge, Des Moines, Ottumwa and Keokuk lie upon its banks. Large steamboats ascend the river as far as Des Moines, nearly 200 m. from its mouth.

De So'to, Fernando (about 1496-1542), a Spanish explorer, the discoverer of the Mississippi River. Having taken a leading part in the conquest of Peru, he returned to Spain with considerable

gold and obtained a license to conquer and colonize Florida. He then gathered a band of 600, including a steward, a gentleman usher, pages, a gentleman of the horse, a chamberlain and lackeys, and in May, 1539, one year after leaving Spain, landed at Tampa Bay. Immediately fighting and marching began, and the adventurers succeeded in going through Georgia, Alabama and Mississippi, always with the hope of finding a land which would yield gold, like Peru or Mexico. But De Soto was wantonly cruel to the Indians, who, in turn, made war on his company till its number was sadly depleted. However in April, 1541, he reached the Mississippi, which he named the Rio Grande. This he crossed, marching northwest into Arkansas.

Later he tried to descend the Mississippi to the Gulf of Mexico; but he had contracted a fever and died at the mouth of the Red River. Furtively his followers buried him in a ditch, informing the Indians that he had gone to heaven, but that he would soon return. But the Indians noticed the grave, whereupon De Soto's body was unearthed and secretly lowered in the middle of the Mississippi to save its being mutilated. The remainder of the party, 311 in number, reached the Spanish settlement of Pánuco 56 days later.

Detroit', Mich., the county seat of Wayne Co. and metropolis of the state, fourth city in size of the United States, situated on the Detroit River, 251 m. from Buffalo, 284 m. from Chicago, on the Michigan Central, the Lake Shore and Michigan Southern, the Pere Marquette and other railroads. The name was given the river and city by the French, and means the strait.

The city occupies nearly level ground, rising gently from the river, and extends along the river front for about 12 m. and back from the river from 4 to 9 m. The area is about 79 sq. m. It is uniquely laid out. In addition to the usual streets crossing each other at right angles, are many streets and parkways radiating from the Grand Circus Park and Campus Martius, like the spokes of a wheel. This

arrangement, with the great open space in the very heart of the city, gives the effect of lightness and airiness entirely lacking in most large cities. Three of these diagonal avenues—Michigan, Grand River and Gratiot—extend entirely through the city and penetrate to several cities and villages in the suburbs, thus giving easy and quick access to the city from all directions. Woodward Avenue, extending from the river in a northwesterly direction, divides Grand Circus Park and the city into two equal parts. It is one of the most important streets, the lower part being devoted to retail stores and offices, and the central part largely to churches, club-houses and automobile offices and sales-rooms, and the upper part to fine residences. Jefferson Avenue, parallel with the river, is another important business and residence street. Throughout the city the streets are broad, well shaded and well cared for. Detroit has a greater percentage of home owners than any other large city of the United States.

PARKS AND BOULEVARDS. The salient features of Detroit's Park and Boulevard system are Belle Isle Park and the Grand Boulevard. The park covers the whole of a picturesque island in the middle of the river, part of it still maintaining a native forest growth and other portions containing a fine zoological collection, aquarium, floral building, casino, boat houses, and spacious bath house, with 14 miles of driveway and 75 acres of lakes and canals. Its original area was 700 acres, but by filling in the shores about 200 acres are being added to it. A bridge half a mile long connects the island with the main land. At the bridge approach commences the Grand Boulevard, 12 miles long and 150 feet wide encircling the central portion of the city. In the northern part of the city is Palmer Park, of 200 acres. There are in all 40 parks and parkways, with an area of 1250 acres. Under a bond issue of \$10,000,000, voted by the people, plans are in progress to nearly double this acreage. In connection with the parks and school yards, there are sixty playgrounds cov-

ering one hundred and thirty-one acres.

BUILDINGS. The most conspicuous public buildings are the City Hall fronting the Campus Martius, a fine specimen of 19th century municipal architecture; the County Building facing Cadillac Square, and the Federal Building covering a whole square, one block west of the City Hall. Two miles north of the center of the city, fronting Woodward Avenue, is a magnificent public library finished in 1921 at a cost of \$3,000,000. A municipal courts building, new police department, and other city structures are grouped at Macomb and Antoine streets. The finest office buildings in the downtown district are the First National, 25 stories with a height of 312 feet, the Ford, Dime Bank, Penobscot, Majestic, Detroit Savings Bank, Hammond and Union Trust. Towering over the Grand Circus are a number of office structures and hotels, and three miles out on the Grand Boulevard and Cass avenues is the General Motors office building, said to be the largest structure of the kind in the country. Detroit boasts a number of imposing hotel structures, the principal being the Statler, the Cadillac, Wolverine, Tuller and Fort Shelby. Among its 300 church edifices are many examples of the best ecclesiastical architecture.

INDUSTRIES AND COMMERCE. Detroit's remarkable growth in recent times is due mainly to the expansion of its manufacturing industries. The fourteenth census showed it to be the fourth city in the country in this respect, with \$1,230,470,000 of invested capital and a product valued at \$1,803,728,000. Of its 307,000 industrial employes in 1919, 163,000 were engaged in the manufacture of automobile parts and accessories and the assembling of cars. The number of automobiles put out was about 1,250,000. In this respect Detroit is the leading city in the world. Other important branches of manufacture are foundry and machine shop products, adding machines, aluminum castings and wares, brass products, druggists' preparations, soda ash and other coarse chemicals, and tobacco manufactures.

The situation of Detroit on the strait connecting the Upper and Lower Lakes has always given importance to its navigation and ship-building interests. In recent years its yards have built a larger tonnage of freight and passenger vessels than any other port on the lakes. It has a larger fleet of excursion and tourist steamers than any other port in the country except New York. The actual freight tonnage passing through Detroit river in the most active season was 100,907,279 and this was more than that entering and clearing the ports of New York and London combined. This is the crossing point for a large part of the freight and passenger traffic bound from the west to and through Canada. Passenger ferries, car ferries, and a double tube tunnel facilitate the crossing. An international bridge across Detroit River is in process of construction.

EDUCATION AND CHARITY. The Public School System of Detroit comprises 142 elementary, six intermediate, and ten high schools, a Teachers' College, and Junior College, and a College of Medicine and Surgery. They employ 4,083 teachers, with 137,600 pupils in attendance in March, 1922. There are also 70 private and parochial schools with about 40,000 pupils and two large commercial colleges. Higher education is provided by the University of Detroit (S. J.) and a College of Law. The Public Library System comprises a large central library and 15 branches. The city owns a Museum of Art with valuable collections of paintings, statuary and curios, and there are numerous art and music schools.

The city operates three large hospitals and there are also the following private institutions: Detroit Tuberculosis Sanatorium, Children's Hospital of Michigan, Women's Hospital and Infants' Home, House of Providence, Harper, St. Mary's, Grace and Henry Ford Hospitals.

The Y. M. C. A., Knights of Columbus and the Y. W. C. A. are among the strong religious institutions.

Detroit River, the narrow strait forming the connecting link between

Lake St. Clair and Lake Erie and separating for a short space the Province of Ontario from southern Michigan. It is 27 miles in length and from one to three miles wide. The city of Detroit lies on the Michigan bank and Windsor upon the Canadian, while on its waters are many beautiful islands, chief among which is Belle Isle, a public park of the city of Detroit. The river is navigable to the largest lake boats and all the tonnage of the upper lakes passes through it. Its tonnage exceeds that of any other body of water in the world.

Deucalion, *Du ka' li un*, a virtuous man of the mythical race of Prometheus, who, with his wife Pyrrha, alone was spared from the flood with which Jupiter destroyed the world during the impious Age of Brass. When the waters subsided and they found themselves on Mt. Parnassus, this good couple entered the temple, there to learn from the gods how to repopulate the earth. To their surprise they heard the command: "Depart from the fane, veil your heads, loosen your girded vestments and cast behind you the bones of your great parent." Literal obedience would have been sacrilege; fortunately they bethought themselves of stones, bones of their mother Earth. Those cast by Deucalion became men; those by Pyrrha, women.

Development of animal life, all animal life, no matter how complex starts in the condition of a single microscopic cell the adult stage of any animal represents the last step in a long series of modifications. The development of all animals is remarkably alike, from the single cell there can be, by division, many cells, these continue to grow and divide, and thereby a large number of cells arises. These arrange themselves into definite forms, from which all parts of the body are formed.

Deuteronomy, *Du' ter on' o my*, the fifth book of the Bible, and the last one of the Pentateuch. This book is a repetition of the Law, consisting mainly of three addresses by Moses to those who, born in the wilderness, had not heard the original pronouncement of the Law.

DEVIL

The first address is introductory, containing a reminder of the deliverance of the people from bondage and an exhortation to obedience in the future. The second is a practical exposition of the whole Law, beginning with the Ten Commandments. The third is the solemn renewal of the covenant, including a statement of the blessings that follow the observance of the Law, and of the penalty for neglecting it. The book concludes with an account of the death of Moses and his burial in a "valley in the land of Moab."

Dev'il, in theology, an evil spirit. More particularly, Devil is the name applied to Satan, the father of lies, represented in the Bible as an evil spirit who has for years led the kingdom of his kind in warfare against God and righteousness. A belief in a host of demons is a characteristic of various old religions of the East; Zoroastrianism in particular recognized an evil principle, Ahriman, served by several orders of inferior spirits. According to the Mohammedans, Eblis, the Devil, was an archangel whom God used to destroy a race of men who inhabited the earth before Adam. The doctrine of Scripture on the subject of the Devil has been blended with much superstition and pagan mythology. The early Christians as a rule ascribed all forms of evil and misfortune to the Devil and his subjects, such as failures of the crops, pestilence, insanity, heresies, etc. The idea that the Devil was lord of the wicked brought about the custom of exorcising. The Devil, however, was thought to have no power over the good. The lives of the saints, especially through the Middle Ages, are full of stories of their encounters with the Evil One, who was represented as having horns, a tail and a cloven foot. Belief in demonology and witches persisted until modern times, but with the progress of science it has gone the way of many other superstitions. The character of Satan has been found an interesting study in literature, notably in Milton's *Paradise Lost* and Goethe's *Faust*.

DEW

Dev'ilfish", or **Dev'ilray**", a Southern fish of the Sea Devil Family. Its body is shaped much like the lower part of an anchor, as the fleshy fins curve in the form of the flukes. These fish become sometimes 15 or 20 ft. in length and several feet thick. The head has two movable appendages, known as the cephalic lobes, which are really highly developed portions of the pectoral fin. The devilfish is exceedingly strong, and when harpooned, has been known to drag a boat for some distance at a considerable speed. These peculiar fish are found in the gulfs of Mexico and California, and along South American, Japanese and East Indian coasts.

Devils Lake, a large lake of North Dakota, lying between Ramsay and Benson counties, 90 m. w. of Grand Forks. The lake is long, narrow and rather crooked, and its shores are picturesque. A flourishing Chautauqua Assembly holds its summer encampment upon the north shore of the lake, and many other resorts dot its banks. The city of Devils Lake is also on the north, and Ft. Totten and the Cuthead Sioux Indian Reservation are on the south. The lake is about 40 m. in length, but varies greatly in width.

Dew, moisture which is formed on the surfaces of cool bodies, especially at night. On clear nights in warm weather the temperature of some objects becomes lower than the dew point of the surrounding air, and the moisture of the air is condensed upon them, leaving tiny drops of water on the surface. This difference in temperature is due to the rapid radiation or throwing off of the earth's heat and the relatively slower cooling of the surface air which receives the heat. When the temperature of the surface falls to the freezing point of water, the deposition of moisture takes the form of ice crystals and is known as *hoarfrost*. Plants throw off their heat very rapidly, and it has been shown that the most flimsy covering, such as a cambric handkerchief, if spread over but not in contact with a flower, is sufficient to hold in its warmth and interfere with

the formation of dew or frost. It is in accordance with this principle that crops are protected, when frost is expected, by smoke from fires at intervals in the fields. The smoke serves as much to prevent the escape of heat as to provide additional warmth.

The *dew point* is the temperature at which the air must be cooled to cause the water vapor in the air to begin to condense. This temperature may be determined by a simple experiment. If a polished metal cup partly full of water be gradually cooled by the addition of small pieces of cracked ice and by stirring, finally a temperature will be reached at which fine drops of moisture will appear on the outside of the cup. Note this temperature of the water with a thermometer. If the cup is allowed to warm up, the moisture will soon disappear from its surface; note this temperature. The average of these two temperatures, which will be the more nearly equal the more carefully the test has been, is the dew point, as the air very close to the cup was cooled to the dew point and dew was deposited on the cup.

Dew'berry, a name given to several varieties of blackberries prized for their luscious fruits. It differs from the blackberry chiefly in the early production of its fruit. Dewberries grow wild in many parts of the United States, but have recently been promoted to the rank of garden shrubs. See BLACKBERRY.

Dew'ey, George (1837-1917), an admiral in the United States navy, born at Montpelier, Vt., and graduated from the United States Naval Academy in 1858. He was attached to the frigate *Wabash* until 1861 and then to the sloop *Mississippi* of the West Gulf Squadron, under Farragut. Having previously been commissioned lieutenant in April, 1861, he aided in forcing the defenses of New Orleans, and subsequently, at the Battle of Port Hudson, ran the *Mississippi* ashore in a fog and set her on fire. He later served on various vessels in the North Atlantic Blockading Squadron and in the European Squadron, and on Feb.

9, 1896, he was promoted commodore. At the outbreak of the war with Spain Dewey assumed command of the Asiatic Squadron, with which, on May 1, 1898, he completely annihilated the Spanish Asiatic Squadron under Montojo in the Battle of Manila Bay. Without losing one American, he destroyed 11 of the enemy's vessels besides capturing all the remainder and the land batteries. For this Congress thanked him and made him rear-admiral. The following year he was a member of the Philippine Commission and was promoted admiral. In 1900 he was made president of the general board of the navy, and in 1901 he was made president of the Schley court of inquiry.

Dewey, John (1859-), an American psychologist and educator, born at Burlington, Vt., educated at the University of Vermont and at Johns Hopkins University. He was professor of psychology in the universities of Minnesota and Michigan, and of philosophy in the universities of Chicago and Columbia. Resigning the latter position, he accepted a similar one in the American College at Rome. He has become widely known through his lectures and contributions to educational journals. His principal works are *The Critical Theory of Ethics*, *Leibnitz's Essays Concerning the Human Understanding*, *Psychology of Number*, *The School and Society* and *Studies in Logical Theory*.

Dewey, Melvil (1851-), an American librarian and educator, born in Adams Center, New York. He was assistant librarian at Amherst College from 1874 to 1877, and first published his *Decimal System of Classification*, now extensively used, in 1876. After removing to Boston he founded the *Library Journal*; he also assisted in founding the American Library Association, of which he was secretary from 1876 to 1891 and president from 1891 to 1893. He became librarian of Columbia University in 1883 and in the following year established a school of library economy, the first of its kind ever organized. From 1887 to 1906 he was director of the New York

State Library, and it was while he was secretary of the University of the State of New York (1888-1900) that his reorganization of the state library made it one of the best in America.

Dew Point. See DEW.

Di'amond, a mineral composed of pure carbon. It is the hardest of known substances and the most valuable of precious stones. It crystallizes usually in an eight-faced form with a perfect octahedral cleavage, the edges and faces frequently being curved. It resists the attacks of acids and alkalies, but in intense heat is reduced to carbon dioxide. Its brilliancy is due to its property of refracting light rays and dispersing all the prismatic colors. It becomes electric and phosphorescent under friction. The finest specimens are of brilliant luster, transparent and colorless, though some of the most valuable gems contain color. Red, yellow, brown, blue and pink have been found, but such stones are of no value as jewels unless the color is pure and uniformly distributed. The origin of the diamond is doubtful, but the occurrence of the deposits in the perpendicular pipes of "blue earth," which are supposed to be the vents of ancient volcanoes, has led to the conclusion that their presence is due to volcanic activity, the stones either having been ejected from the earth's interior or formed by contact of molten rock with a shale containing carbon. Diamonds have been frequently washed from their original beds and are found in the bottoms of streams and places which were once the beds of rivers.

In the rough the diamond has the appearance of quartz. To reveal its beauty it must be passed through a careful process. First, the stone is cemented to a holder. It is then struck with a steel blade in a direction parallel to one of the lines of natural cleavage. This is repeated until all the facets are exposed, the position of the stone being adjusted from time to time. The surfaces are then ground with another diamond of inferior quality until they are smooth and uniform. For the final buffeting the dia-

mond is placed in a matrix at the apex of a solid metallic cone and polished by means of a small disk of spongy cast iron, smeared with olive oil and diamond dust, which turns on a spindle at a speed of 2000 revolutions per minute. The favorite cut for commercial diamonds is the *brilliant*, which has 58 facets. Other cuts are the *rose* and the *briolette*. The fine particles thrown off in the process of cutting are afterwards used for polishing and the larger fragments in glass cutting, drilling, and copperplate engraving and for watch jewels and etching points. Microscope lenses are sometimes made of diamond. Diamonds have been produced artificially, but the process is too expensive to make it commercially profitable. Diamonds are found in certain parts of the United States, in British Columbia, British Guiana, Russia, China, India, Borneo, Sumatra and Austria. The chief diamond areas at the present time are in Brazil and Cape of Good Hope; the former yield the purest stones in the world; the latter the largest quantity, with an average annual output of a half ton, or nine-tenths of the world's product, valued at \$15,000,000. The value of a diamond depends upon weight, brilliancy, cut and individual perfections. One of the most valuable of historic stones is the Hope diamond, a beautiful blue gem weighing 44½ carats and valued at \$125,000. Other noted stones are the Kohinoor, one of the jewels of the British crown, which weighs 102¾ carats; and the Orloff, in the possession of the royal family of Russia. Both of these are of Indian origin and have romantic histories. The Pitt diamond, formerly a French crown jewel, now in the Louvre, Paris, weighs 136 carats and is valued at \$2,500,000. The Cullinan diamond, the largest of which there is record, was discovered in 1905 in the Transvaal. It weighs 302.475 carats, or 1.37 lb., and is one of the purest stones known. Its value has been estimated to be \$2,500,000 to \$5,000,000.

Dian'a (in Greek, Artemis), virgin goddess of the moon and of the chase,

was the daughter of Jupiter and Latona and sister of Apollo. Diana had 80 nymphs as attendants and comrades. She presided over 30 cities. To her temples women alone were admitted, in virtue of her being divine guardian of child-birth. Diana was thought of as a severe, though handsome and athletic, woman. She has been variously represented as huntress queen, with the silver bow and arrows made by the Cyclopes; as god-



DIANA

dess of the moon, with a shining crescent above her brow; or as mistress of nymphs, in her stag-drawn chariot.

Diana, Temple of, a magnificent building at Ephesus, begun about 540 B. C. and completed some 220 years later. The first specimen of Ionic architecture, it was 425 ft. long, 220 ft. wide and contained 127 Parian marble columns, each of which was a single shaft 60 ft. in length. It was decorated by the artists of antiquity, and the great Praxiteles em-

bellished the shrine. Despite the extreme reverence in which it was held, the temple was partially burned by Herostratus in 356 B. C. Nero subsequently despoiled it, as did the Goths in 262 A. D. It was rapidly destroyed after the introduction of Christianity, many of its treasures being removed and readjusted for use in Christian churches. As an example, two of its pillars may be seen today in the great Church of Pisa, and its green jasper columns now support the dome of Saint Sophia in Constantinople. This temple, one of the Seven Wonders of the ancient world, was built as a fitting home for a block of wood rudely cut into a grotesque likeness of Diana, goddess of nature, which was believed to have fallen from heaven.

Diaphragm, *Di'a fram*, in anatomy, the large, broad, nearly circular muscle, extending from front to back, and forming a partition between the chest cavity and the abdominal cavity. It is attached in front to the sternum, or chest bone, and to the first lumbar vertebra of the spine, and reaches on the side to the 12th rib. During quiet respiration, or while the air in the chest is stationary, it curves upward, but becomes flattened with a full inhalation, pushing the abdomen downward and outward. It is an important agent in respiration, particularly in inspiration. See RESPIRATION.

Dias, *De'ahsh*, Bartholomeu (1450-1500), a Portuguese navigator, the discoverer of the Cape of Good Hope. In 1488 he completed a voyage, up to that time the greatest in history. Having sailed down the African coast, he doubled the Cape of Good Hope and sailed for several hundreds of miles into the Indian Ocean. He returned to Lisbon over the same route, having covered in all 13,000 miles. Dias perished while returning from a subsequent trip to Brazil.

Di'atom, a name given to a class of one-celled algæ which are found in fresh and in salt water and on damp soil. Each individual is microscopic in size, solitary and free-swimming, but there is a tendency among them to join in long chains or groups. The cell wall is made up of

two valves which fit into each other like a box and its cover and are largely composed of silica. On account of the delicate markings of these valves they are used to test the fineness of lenses.

Diatoms are the main constituent of plankton, the free-swimming organic world on the surface of the ocean, and are also found as fossils, forming a large part of the siliceous earth, or mountain meal, used in the manufacture of dynamite. Infusorial, or diatomaceous, earth is also a fine white, powdery substance composed mostly or wholly of diatoms. There are many large deposits found in all parts of the world. Among the largest are a stratum 40 ft. thick and many miles in extent found near Richmond, Va., one 50 ft. thick, near Monterey, Cal., and another 14 ft. thick in Bohemia. It is estimated that one cubic inch of this fine slate contains at least 4,000,000,000 diatoms. Infusorial earth is also known as kieselguhr. It was once supposed to have been formed by the remains of infusoria.

Diaz, *De' ahs*, **Narcisse Virgille** (1807-1876), a landscape painter born of Spanish parents at Bordeaux, France. He became an orphan at ten years of age and was adopted by a Protestant clergyman of Bellevue, who allowed him to wander through the woods where he absorbed a love for nature, later expressed in his charming landscapes. On one occasion he was bitten by a poisonous serpent and as a result one leg was amputated. Diaz was first apprenticed to a porcelain decorator, and there his talent first expressed itself. Later he studied in Paris and Barbizon, where he became readily recognized. His pictures are chiefly landscape, rioting in the colors of autumn, displaying beautiful effects of light and shade on the leaves and usually showing great numbers of nymphs, richly dressed gypsies or Oriental figures. His work was always strikingly original and always in great demand. Among his best-known works, some of which are in American collections, are *Venus and Cupid*, *Descent of the Gyp-*

sies, *Love Disarmed*, *Hounds in the Forest*, *A Storm* and *A Road in the Forest*.

Diaz, **Porfirio** (1830-1915), a Mexican general and president. He was partly of Indian descent on his mother's side. Although he enlisted in the war with the United States in 1847, he saw no active service. He studied law at the Institute of Arts and Sciences and became professor of Roman Law in the Institute. Under Herrera he took part in the revolt against Santa Anna and won distinction in resisting the French invasions in 1863. Placed in command of the Republican army in the South, he took the City of Mexico in 1867, and thus ended Maximilian's attempt to secure an empire. Diaz was made provisional governor, and in April, 1877, he was elected as president, his term ending in 1880. He served in the cabinet of his successor, Gonzales, was president again in 1884 and continued to hold the office until in 1911, when the people opposed to his long rule rose in a successful revolt. Diaz left Mexico and was succeeded by the leader of the opposition, Francisco Madero. Mexico made great progress under the rule of Diaz. He placed the finances on a firm basis, encouraged agriculture, industries, railroads and telegraphs, established a good public school system and made his country respected abroad.

Dice, little cubes of bone or ivory, known with their present markings since 1244 B. C., and doubtless used much earlier in various games of chance for which they are still universally employed. From one to five are commonly used, and there are several methods of *throwing*; but usually they are shaken in a light cylindrical box, from one and one-half to two inches in diameter and about four inches high, and then thrown upon some smooth flat surface, where the *throw* is counted according to the rules agreed upon. Gamblers, though commonly supposed to favor games of chance, have not infrequently eliminated it by the dishonorable substitution, in their own throws, of dice loaded on one side so that the force of gravity would necessarily turn up the numbers most

desired. Sometimes dice have been so loaded that strong electromagnets, switched on and off at pleasure, permitted the gambler to rob his victim as often as he considered it safe.

Dicen'tra, locally called Dutchman's breeches, soldier's caps or white hearts, from its odd-shaped flowers, a member of the Fumitory Family. It is found in April and May in southern Canada and in the United States east of the Mississippi. The leaves are thin and finely cut, sage-green in color. The flower stalks spring directly from the root and bear several nodding, white flowers whose shape gives them their name, dicentra meaning two-spurred. The aptness of the local names is apparent. A very similar species, squirrel corn, has finer cut, more feathery leaves and lavender-tinted flowers, which are more tubular than the preceding. It takes its name from the yellow kernels or tubers found on its roots.



DICENTRA

Dickcissel, *Dik sis'el*, or **Black-Throated Bunt'ing**, a bird of the Finch Family. The dickcissel is a trifle larger than the English sparrow. The body is a gray-brown above, and white, tinged with yellow, below; the middle of the back is streaked with black; the nape and

side of the head are ashy gray; the crown is olive streaked with dark gray; and there are yellow stripes on the face. The throat is white with a black patch; the wings have a reddish-brown patch, two chestnut bars and a yellow edge. The females lack the black throat patch. The



DICKCISSEL

nest is made of dried grass, and is usually placed on the ground, although it may be placed in a low bush. Three to five pale blue eggs are laid.

The dickcissel ranges throughout America east of the Rocky Mountains, where it is a most abundant bird in fields, meadows and prairies, flocks of 200 or more being not uncommon. The song is very sweet. The dickcissel feeds upon grain and seed, as well as upon grasshoppers, caterpillars and other insects.

Dick'ens, Charles John Huffam (1812-1870), eminent British novelist, was born at Landport, then a suburb of Portsmouth. His father, John Dickens, who was the original of the rhetorical and hopeful but unsuccessful Mr. Micawber of *David Copperfield*, moved his family to Chatham in the County of Kent about 1816. It was here that Charles received his first schooling, spent many happy hours in an upper room of his father's house in the glorious company of such characters as Tom Jones, Robinson Crusoe and Don Quixote, and dreamed of becoming a great man. Financial reverses brought the family to London in 1821, eventually to a home in that famous debtors' prison, the Marshalsea. Little Charles, proud, sensitive and full of bright hopes, was put to work in a blacking warehouse, where he suffered untold miseries amid sordid surroundings and uncongenial companions. This unhappy experience, which lasted somewhat over a year, was followed by two years of schooling and an under-clerkship in a solicitor's office. Being too ambitious to remain in so unpromising a position, he mastered the art of shorthand in his spare hours, and by the time he was 19 he had become a reporter in the House of Commons for one of the London newspapers.

It was during his career as a reporter that Dickens began his literary work. In 1833 the *Monthly Magazine* published the first of a series of sketches of London life, which were later called *Sketches by Boz*. These sketches, with their spirited and realistic pictures of London streets, shows, pawnshops and characters, bore the stamp of the long novels which soon were to issue so rapidly from his pen. In 1836 Dickens was married, and in the same year he began, in monthly installments, his famous *Pickwick Papers*. Before long all London was laughing at the homely wit of Sam Weller and the exploits of the Pickwickians were the talk of the town. The reputation of the novelist was assured and from that time until his death his popularity was phenomenal.

Oliver Twist, his next contribution,

was the first of the novels written to open the eyes of the public to the wrongs of certain English institutions. *Oliver Twist* is the victim of the corrupt work-house system, while in *Nicholas Nickleby* the author lays bare the horrors of the cheap Yorkshire boarding school. So truly did he write that certain indignant Yorkshire schoolmasters threatened libel suits after the publication of *Nickleby*. Dickens became the great literary exponent of the movement of his day which looked toward the redress of the sufferings of humanity, and his influence on his times was considerable. His aim was to make men more humane in their treatment of their fellow creatures and one biographer has well said of him: "So long as he is read, there will be one gentle and humanizing influence at work among men." *Bleak House*, an exposure of the law's delay in the chancery courts, and *Little Dorrit*, a revelation of the harsh laws against debtors, are two other notable books of the purpose type.

In 1842 Dickens made his first visit to America, being received with unheard-of demonstrations of admiration and affection. Lovers of Dickens on this side of the Atlantic have long since forgiven his rather frank comments on American life in *American Notes* and *Martin Chuzzlewit*, published after his return. At the close of 1843 he wrote the first of a series of Christmas stories, entitled *A Christmas Carol*. This story, with its beautiful message of love and good cheer, has been called by Thackeray a "national benefit." Among other books are *David Copperfield*, the most autobiographical of his novels, and *A Tale of Two Cities*, a story of the French Revolution containing one of the best of the author's creations, the heroic Sidney Carton. He was at work upon *The Mystery of Edwin Drood* when he died.

Dickens made several trips to the Continent, but England was his favorite place of sojourn. Possessed of splendid dramatic powers, he was for many years an enthusiastic member of a company of amateur actors, and in the latter part of his life he was constantly engaged in

giving readings from his own works. He undermined his health in this arduous labor and died at the age of 58 in his well-beloved home, Gadshill, a place which he had so admired as a boy that he afterwards purchased it when the years had brought him popularity and comfort.

Whatever literary criticism has to say of the work of Dickens, public interest in him as a man is constantly increasing. His delightful personality and kind heart have put their indelible mark on everything he wrote. In all of his books we find the irresistible humor, tenderness and good will of his own nature. His faults are obvious: his novels are unwieldy in form, his pathos is sometimes artificial and he is given too much to exaggeration and too little to reflection. On the other hand he had amazing powers of observation, revealed in the minuteness and clearness of his descriptions of scene and character. His English may lack charm and melody, but it is clear and forceful. Moreover he had no equal in the range of his creative genius, and the host of characters that animate his books will live as long as those books are read.

His principal works are *Barnaby Rudge*, *Bleak House*, *David Copperfield*, *Dombey and Son*, *Great Expectations*, *Little Dorrit*, *Martin Chuzzlewit*, *Nicholas Nickleby*, *Old Curiosity Shop*, *Oliver Twist*, *Our Mutual Friend*, *Pickwick Papers* and *A Tale of Two Cities*.

Dick'inson, John (1732-1808), an American statesman, born in Talbot, Md. He studied and practiced law in Philadelphia, and enlisted in the Revolutionary War, rising to the rank of brigadier-general. Opposed to the taxing of the colonists by the British, he is said to have been the first to use the expression, "No taxation without representation." However, as a member of the Continental Congress he refused to sign the Declaration of Independence, because he believed that Congress was acting prematurely. He represented Delaware in Congress in 1779, became governor of the state in 1781, was elected governor of

Pennsylvania in 1782, and was president of the state executive council from 1782 to 1785. In 1782 he founded Dickinson College, at Carlisle, Pa.

Dick'son, Pa., a city of Lackawanna Co., 4 m. n. of Scranton and 166 m. n. of Philadelphia, on the Delaware & Hudson and the New York, Ontario & Western railroads. Electric railroad lines also connects the city with Scranton and all points in the Wyoming and Lackawanna valleys. Coal mining and shipping is the chief industry. The city contains large silk mills, foundries and machine shops. Dickson City is situated nearly in the center of the chief anthracite center of the United States, and there are a number of large collieries within its limits. There are good public buildings and numerous churches. Population in 1920, 11,049.

Dictagraph, Dik' ta graf. See PHONOGRAPH, subhead *Dictagraph*.

Dicta'tor, a magistrate of the Republic of Rome. This officer, who was appointed only in times of great emergency, possessed extraordinary powers. He had the power of life and death and could punish without appeal to the Senate or people, but he had no control over the public funds without the permission of the Senate. All the other magistrates were subject to his commands. The dictator was forbidden to go out of Italy, and could not appear in Rome on horseback without the permission of the people. The power of naming a dictator was vested, by a resolution of the Senate, in one of the consuls, and the dictatorship was limited to six months.

Dictionary, Dik' shun a ry, a book containing a list or partial list of the words of a language, with their pronunciations and definitions. The first dictionaries were merely collections of rare or unusual words; such books were in use among the Arabians, Romans and Greeks. The first English dictionary was that of Nathan Bailey, published in 1721, and it was followed in 1755 by Dr. Samuel Johnson's celebrated dictionary, which, though containing many errors and inconsistencies, is yet an authority

in many points. He introduced the practice of illustrating the meanings of words by quotations from prominent authors.

In 1828 Dr. Noah Webster published the first American dictionary. This has been frequently revised and is now generally known as *Webster's International Dictionary*. *Worcester's Dictionary*, published about the same time, became very popular but is now not greatly used. The *Century* and the *Standard* are modern dictionaries that with the *New International* are the leading authorities in the United States.

Diderot, Deed"rō', Denis (1713-1784), a French writer and philosopher, born at Langres. He studied in the school of the Jesuits in his native town and in the College of Harcourt, Paris. His allowance being cut off by his father for his refusal to become a lawyer or physician, he sought employment as a tutor and writer. Several of his works that soon appeared were objectionable to the government and the clergy, and he was imprisoned at Vincennes. Together with D'Alembert he planned and edited a large encyclopedia, which occupied his attention for nearly 30 years. The articles on technology and the industries, and several of those on philosophy, physics and chemistry were written by him. The work as a whole was complete and possessed distinct literary value. The remuneration for it, however, was slight, and near the end of his life Diderot sold his library to provide means for his only daughter. He also translated Stanyan's *History of Greece*. Among other writings are *The Nun*, *Rameau's Nephew* and *Little Papers*.

Di'do, daughter of Belus, King of Tyre, and sister of Pygmalion, who later became monarch. Sichæus, her husband, had a vast fortune which her brother so coveted as to have him murdered for it. Dido, however, managed to hide this wealth, and, in company with many of the chiefs of the nation, to escape to the coast of Africa. Her settlement here she called Byrsa, a Greek word meaning hide, from the circumstance of the natives having allowed her only as much

land as could be covered with a bull's hide. By cutting the hide into strips and by piecing these together, Dido succeeded in enclosing a large tract of ground. This was the nucleus of Carthage.

When Æneas was shipwrecked on her shore, Dido entertained him with a hospitality which ripened into love. Because he left her, she stabbed herself. After her death she was accorded divine honors by her subjects.

Die and Die Sinking. A die is a hardened steel tool for stamping and punching. Die sinking is the art of making dies. Dies are of two sorts, those which leave a raised impression on the object stamped and those which sink their impression into the object, and which are generally known as punches. The first step in making a die used as a punch is to fashion a piece of soft steel so that the form will contain an impression exactly opposite that of the die to be made; that is, if the die were to stamp the letter A, the first die, or matrix, would have the A sunk into its face. The matrix is then hardened. The next step is to drive the matrix on to the end of a bar of soft steel, so as to cut the A in relief, thus forming the die. The die is then hardened and is ready for use.

The use of dies for shaping and stamping out articles of metal and other materials is comparatively new, and their application in many industries plays an important part, particularly in working alloys of tin, copper and zinc, and in working cold steel into various forms, processes which were formerly possible only by tedious methods of casting or forging. Many kitchen utensils, pens, buttons, boxes, parts of shoes and of lamps, besides many other objects which were formerly worked into shape by hand with hammer or soldered together, are now struck out or formed between two dies of suitable shape. Dies are fitted to a press operated by hand or machine driven. The older uses are for stamping coins and medals, and marking or ornamenting objects made of steel or other metals.

Diffraction, *Dif frak' shun*, a phenomenon of wave motion generally spoken of in connection with light and sound. If a beam of sunlight be admitted to a darkened room through a small hole and allowed to fall on a screen, an image of the sun is formed. If the hole be made very small, like a pinhole, the image will be bordered by one or more fringes of rainbow colors. Similar phenomena may be observed by looking through a finely-woven handkerchief at a small bright source of light some distance away. The slight bending of the rays of light when passing through small apertures or when passing by the edge of an opaque object is called diffraction. The rays of red light, which has the longer wave-lengths, are diffracted more than are the rays of blue light, which have the shorter wave-lengths, and hence the spreading out of the light into a rainbow-colored fringe.

Diffraction screens or *gratings* are polished glass or metal plates ruled with a great many fine parallel and equidistant lines (from 1000 to 20,000 lines per inch), or merely a series of fine parallel wires, which was the first form of grating used. When a beam of light passes through or is reflected from such a grating a spectrum is produced, and such gratings are much used instead of prisms in scientific work to produce spectra for the study of various sources of light.

Diffraction also occurs in the case of sound waves. The bending of light waves around the edges of opaque objects is very slight, owing to the extremely short wave-length of light; hence shadows cast by opaque objects in the path of light are very sharp. But in the case of sound, with wave-lengths varying from a few inches to many feet, the bending of the sound rays around the edges of objects is very decided; hence large objects do not cast sharp sound shadows, while small objects, of the same general dimensions as the length of sound waves, fail to cast shadows at all.

Diffusion, *Dif fu' zhun*, the process by which the particles of substances in contact, either gaseous or liquid, tend

to become uniformly intermingled. It is due to the molecular motions of the diffusing substances and is most rapid in the case of gases whose molecules move about very freely and with great velocities. It is less rapid in the case of liquids. If two vessels containing different gases are connected, it will be found that in a moderately short time each gas will have become uniformly distributed throughout both vessels, even though the vessel containing the heavier gas was placed below that containing the lighter one. If a wide-mouthed bottle containing sulphuric acid (slightly colored) and closed by a disk is set in a larger glass jar having sufficient water to cover the bottle, and the disk be carefully removed from the bottle, after several hours the heavy acid will be found entirely diffused throughout the water. When no diffusion takes place between two liquids in contact, they will not mix. For example, oil and water, or mercury and water, even when shaken together, will not mix; this is largely due to surface tension, the forces of cohesion being stronger than those of adhesion. In the case of oil and water, if shaken thoroughly a fairly uniform emulsion is obtained, but the little droplets of oil are still separate from the water.

The diffusion of solids into one another has been shown in the case of practically all metals when at moderately high temperatures, as 500° C. At ordinary temperatures, it has been demonstrated only in the case of a sheet of lead in contact with a sheet of gold, gold having been detected throughout the mass of the lead after the lapse of a long time.

Digestion, *Di jes' chun*, the process by which food is prepared for absorption or assimilation in the body. It begins with the mouth, the first act of digestion being mastication, by which the food is reduced to pulp and mixed with saliva. In this first step of the process the salt and sugar are dissolved and the enzyme, ptyalin, changes the starch into a double sugar, called maltose. On entering the stomach the food goes through a slight churning process, and is sub-

jected to action of the gastric juice, a thin colorless liquid, the essential elements of which are a free hydrochloric acid and pepsin. This juice exerts a solvent action on certain foods, reducing the albumens to ordinary proteins, proteoses and peptones. It does not act upon fats or sugars, nor upon the starches which have not been acted upon by the ptyalin. Another enzyme of digestion is rennin, which acts upon milk. In the stomach the food is reduced by action of the juices to a mixture called chyme and then passes into the small intestine.

The intestine contains three digestive enzymes: trypsin, which converts proteids into peptone; lipase, which changes fatty acid into glycerin; and amylpsin, which is thought to be identical with the ptyalin of the mouth and which reduces to sugar the starch which has escaped the action of the ptyalin. The bile is important in digestion, aiding the action of the pancreatic lipase and splitting fats. Another intestinal juice completes the process of digestion by bringing all the carbohydrates of the food, except cellulose, into a condition of chyle, or single sugars, which are ready for absorption.

The time ordinarily required to digest a meal is from three to four hours, though the time is subject to wide variation, depending upon the state of health, quality of the food, mental condition and numerous other factors. See FOOD; SALIVA; STOMACH; INTESTINES.

Dike, in geology, a long, narrow strip of igneous rock that has been forced into fissures and there hardened. If the rock thus affected is softer than the dike, it wears away more rapidly and leaves rough uneven ridges upon the rock. Dikes are found in regions where volcanoes have been active, and are chiefly formed of basalt and quartz porphyry. They differ from veins, which contain ores of minerals deposited from solutions.

Dill, an aromatic herb of the Parsley Family, widely cultivated in gardens for use as a flavor. There are three species known, all of which are natives of Europe or Asia. The stem grows from one

to four feet high and bears many finely-divided leaves, which are used in flavoring pickles. The flowers are small and grow in flat clusters, much like those of the parsley, a member of an allied genus. The flowers are yellow, with five-parted calyx and corolla, and are followed by a dry, many-celled fruit, whose cells separate as they ripen, without opening to disclose the seed which fills the entire cavity. The seed contains an oil used in medicine as well as in cookery. Dill grows wild in the region of the Mediterranean, and an Asiatic variety is cultivated for its fruit. It is mentioned in the New Testament as anise, in connection with mint and sweet cummin, and was, with them, subjected to tithe.

Ding'ley, Nelson, Jr. (1832-1899), an American journalist and legislator, born at Durham, Me. He graduated from Dartmouth College in 1855 and was admitted to the bar in 1856, but never practiced. He became editor and proprietor of the *Lewiston Journal*, and held this post for more than 20 years. He served in the Maine Legislature most of the time from 1862 to 1873, being speaker of the House in 1863-1864. In 1874 and 1875 he was governor of the state. He was elected to Congress in 1881 and continued to serve until his death. He framed the tariff law of 1897 which bears his name, and at the time of his death was still chairman of the ways and means committee of the House. He was always a pronounced advocate of temperance. Several colleges granted him honorary degrees in recognition of his achievements as writer and speaker.

Dingo, *Ding' go*, an Australian dog of the wolflike type, which in its wild state has many wolfish characteristics. Its face is pointed, its eyes sharp and bright and its tail bushy. In color, its coat is generally tawny or reddish. When taken young, the dingo is easily tamed and becomes an affectionate pet. In its native state it travels in packs of 100 or more, giving forth continuously its long, fierce howl. It is extremely destructive to sheep and for this reason is hunted like

the wolf by the Australian. Some dingoes have been brought to this country, but, though they take kindly to civilization, they are apt to revert to their wild state.

Dinornis, *Di nor' nis*, the name given to a group of extinct birds which formerly lived in New Zealand. Many of these birds were of gigantic size, the *dinornis maximus* standing nine feet high; the smallest of the 26 species was about the size of a turkey.

These birds, called moas by the New Zealand natives, became extinct about the latter part of the 17th century, their extinction being due to several causes; principally, the persecutions of the natives, who used the birds and eggs for food and the feathers for ornaments. A change in climate is also thought to have hastened their end. Their remains are now found in rock fissures, in old fields where they are plowed up, in swamps and in caves. Several eggs have been found, which are similar to those of the ostrich, and they measure about ten inches in length.

Dinosauria, *Di' no sor' i a*, an extinct order of Reptiles, which were the dominant form of life during the Triassic, Jurassic and Cretaceous periods of the earth's history, as man is the dominant form at the present time. The animal varied greatly in size, some species being no larger than an ordinary barnyard fowl, others ranging from 60 to 70 ft. in length, 10 to 20 ft. in height and weighing from 20 to 25 tons, and always with a brain disproportionately small. The earlier animals were of moderate size, fed on flesh and were agile in movement. They were followed by enormous herbivorous genera that developed a type with two feet and sometimes such protective covering as bony plates, horns and scales. They possessed a lower order of intelligence than the serpent of the present, and became extinct through inability to adapt themselves to environment. Crocodiles are of all existing forms the most closely allied to the dinosaurus. The most valuable fossil remains have been found in Belgium and

in the Rocky Mountain region of the United States. In the latter country the finest collection of specimens is to be seen in the Museum of Natural History in Central Park, New York City. Other important exhibits are in Peabody Museum of Yale University, the Carnegie Museum of Pittsburgh, Field Museum, Chicago, and the Museum of the University of Wyoming, Laramie.

Dinotherium, *Di' no the' ri um*, a genus of extinct Mammals, allied to the modern elephant and extinct mastodon, the remains of which occur in Tertiary formations of India and parts of Europe. Its tusks, unlike those of the elephant, were in the lower jaw and curved downward and backward like the tusks of the walrus. It lived in dense forests and was a land animal. No complete skeleton of the dinotherium has been found, and no traces of it have been discovered in America.

Dinwiddie, *Din wid' dy*, Robert (1690-1770), an American colonial official, born in Scotland. As governor of Virginia (1752-1758), he precipitated the French and Indian War by sending Washington to demand formally that the French leave the upper Allegheny Valley. He was instrumental in securing Braddock and his army from England and in raising a regiment of colonial troops in Virginia. He was constantly at war with the Virginia Assembly over money matters and was recalled in 1758.

Diocletian, *Di' o kle' shàn*, (245-313), Roman emperor from 284 to 305. He was of humble origin but rose in the ranks until he held important military positions. The legions chose him as emperor. He devised a new plan for the reorganization of the empire. With himself he associated Maximian as a colleague and Augustus. He also appointed Galerius and Constantius as assistants with the title of Cæsar. The empire was divided into four parts, with one Augustus and one Cæsar in the East and the same in the West. The empire was also divided into 100 provinces, and the civil power was divided from the military. The officials of the empire were

so organized that each depended on the one above him and all depended on the emperor.

Thus Diocletian took away the last traces of freedom and changed the empire into a pure despotism. New life was given to the dying state, however, by his system and his reforms. Finances were restored, the burden of taxation was more evenly distributed and cities and public works were built. The army was kept along the vast frontier. In 305 Diocletian and his colleague Maximian abdicated and Diocletian spent the rest of his life in retirement at Dalmatia.

Diogenes, *Di o'j'e nez*, (412-323 B. C.), the most noted of the Cynic philosophers, born in Sinope in Asia Minor. Banished with his father on the charge of coining false money, he went to Athens and forced himself as a disciple upon the Cynic philosopher Antisthenes. Adopting the Cynic principles that a man ought to be independent of circumstances and the opinions of others, he lived the plainest sort of a life, practiced rigid self-control, ate the coarsest food, walked the streets barefoot, without coat, his long beard unkempt, a wallet over his shoulders and a staff in his hand, and slept at night on the ground, or under some friendly portico. He was unsparing in the sarcasm and satire with which he criticized the follies and foibles of all classes of society. It is said that he once met Alexander the Great, who offered to grant him a favor. Diogenes replied that all he asked was for Alexander to get out of the way of his sunshine. He is reported at another time to have been walking the streets of Athens with a lighted lantern in broad daylight. When asked the reason, he answered, "I am seeking a man." He was captured by pirates while on a voyage to the Island of Ægina and sold as a slave to a Corinthian named Xenocrates, who set him free and made him the tutor of his children. He spent the rest of his life at Corinth, where he died at a very old age.

Di'ome'des, a Grecian chief of the Trojan War, second to Achilles alone.

He was especially favored of Minerva, and distinguished himself by getting Philoctetes to rejoin the army with his poisoned arrows. With Ulysses he captured the Palladium.

A second Diomedes was a Thracian king, son of Mars, who fed his mares all strangers entering his domain. The eighth labor of Hercules was to capture these horses. This he did, feeding them Diomedes before he led them off to Mycenæ.

Dionysius, *Di'o nish'i us*, the Elder (about 431-367 B. C.), a tyrant of Syracuse, of humble origin. He drove the Carthaginians to the western part of the island, made Syracuse the greatest city of the Greeks and established an empire which included the greater part of Magna Græcia as well as some islands and colonies in the Adriatic. His greatest service was saving the western Greeks from destruction, but his empire fell soon after his death.

Diox'ygen. See HY'DROGEN PEROX'-IDE.

Diphtheria, *Dif the' ri a*, a dangerous, infectious disease caused by a bacterium, well known to medical science. Its presence is first indicated by the formation of a white membrane in the linings of the air passages and especially in those of the throat. The tonsils are apt to be first affected and cases first diagnosed as tonsillitis are apt to be found later to be diphtheria. The throat trouble is accompanied by fever, nervousness and sleeplessness. Patients suffering from diphtheria should be isolated and all articles which enter the sickroom should be disinfected before being used elsewhere. In 1894, an antitoxin was discovered which upon being injected hypodermically was able to counteract the effects of the disease and destroy the bacterium which produced it. Although some physicians have objected to the use of this remedy, it has been proved to be efficacious during an attack and it will render a person immune if taken during the epidemic. Diphtheria is particularly to be combated since it is apt to bring in its train paralysis, spinal meningitis, Bright's disease, long-continued

nervous troubles and loss of sight or hearing.

Diplo'macy, the art or science of conducting negotiations between nations and adjusting their relations through the service of representatives. The methods of diplomatic action vary according to the magnitude of the interests concerned and to the nature of the emergency. For the settlement of questions vitally affecting several states, or such as involve the peace of a continent, or the general policy of the great powers of Christendom, a general congress may be summoned. Such was the Congress of Westphalia held in 1648 to settle the issues involved in the Thirty Years' War, the Congress of Vienna in 1814, by which the problems arising out of the Napoleonic wars were adjusted, and The Hague Conference in 1899 for promoting the peaceful adjustment of international differences of all civilized countries.

Questions of less general importance arising among two or more countries or states are more frequently settled by formal treaties directly negotiated by the regular diplomatic representatives. These claims are, however, sometimes adjusted by joint commissions appointed for the purpose. When these claims cannot be so adjusted by negotiation, resort may be had to arbitration. Matters of still less importance, not requiring the sanction of a treaty, are commonly dealt with in informal conferences between the foreign offices of the states concerned, and these result in friendly understanding as to future policy. The international relations of states with which diplomacy has to do, however, are only those of a peaceful character. With the outbreak of war, diplomatic relations come to an end and the suspension of such intercourse is usually a preliminary to a declaration of war, though it is sometimes employed as a means of coercion of a weak state by a more powerful one.

The management of the foreign intercourse of a nation is one of the most important functions of the chief executive and has, in modern times, passed into the hands of a class of officials known

as diplomatic agents. These officials are invested with an extraordinary degree of dignity from the fact that they represent the person of the sovereign and not merely the foreign office of the country from which they come. The transformation of diplomacy from the act of using personal influence in the management of men to the more prosaic and worthy one of managing the business of the state with foreign nations has necessitated a change in the organization and character of the diplomatic service. The personal qualities necessary for smoothness of address, on which the old diplomacy was based, have given way to the knowledge of the laws and conditions of trade, and of men and affairs, which the new diplomacy requires.

AMBASSADOR. This term was formerly applied to all accredited diplomatic agents, but the title is now strictly appropriate to the highest class of diplomatic representatives. In the year 1815 the eight principal powers represented at the Vienna Congress agreed upon a gradation of diplomatic agents who were henceforth to rank as follows: (1) ambassadors, legates and nuncios of the pope; (2) envoys, ministers and others accredited to the sovereign; (3) *chargés d'affaires* accredited to the department of foreign affairs. Ambassadors are ordinary when they reside permanently at a foreign court, or extraordinary when sent on a special mission. When ambassadors-extraordinary are vested with full powers, as of making treaties, concluding peace and the like, they are called plenipotentiaries. Envoys are ministers employed on special occasions and are of less dignity than ambassadors.

The United States until 1893 had been represented at foreign courts by persons with the rank of minister-resident, accredited in the care of the great powers as envoys-extraordinary and ministers-plenipotentiary, but in that year the president was authorized by Congress to appoint ambassadors of full rank and of equal grade and dignity with those who should be accredited by foreign powers to this country. In accordance with this

act the United States is now represented by ambassadors at the courts of England, Germany, Italy, Austria-Hungary and Russia and the republics of France, Mexico and Brazil. In modern times the ambassador, in accordance with the importance of the duties of his office, has been given the special privileges which a foreign minister enjoys in the country to which he is accredited: (1) exemption of the minister from local jurisdiction, both civil and criminal; (2) inviolability of his house, his papers and his goods from search or seizure; (3) exemption of his personal effects from taxation. The children of ambassadors born abroad are held not to be aliens.

CONSUL. In present usage the term indicates an official who, as the representative of his home government, resides in a foreign seaport or other commercial center to advance its business interests and to protect his fellow countrymen and safeguard their affairs. The duties of the United States consuls are varied, and include the shipment, discharge and relief of seamen of American vessels, adjustment of differences between masters and crews, protection of citizens of the United States, issuance of bills of health, passports, etc. The exemptions and privileges of consular officers depend largely upon the treaties existing between the United States and the countries to which they are sent with credential letters. The United States sends about 30 envoys-extraordinary and ministers-plenipotentiary to foreign governments.

Dip'per. See OUZEL, *Ooz'l*.

Dip'ping Needle. See MAGNET'IC NEEDLE.

Dip'tera, a group of insects including the house fly, mosquito, midge, botfly and Hessian fly. The name means two-wing and refers to the fact that only one pair of wings is ordinarily noticed in members of this class, although a rudimentary pair used as balancers gives the Diptera the same number of wings as other insects. The Diptera go through all the stages of development of perfect insects. The eggs are usually laid in a

bunch and may be found in the tissues of plants or in heaps of decaying matter. In adult form the Diptera are among the most annoying of insects, and are, besides, carriers of disease and destroyers of plants and crops. See INSECTA; FLY; BOTFLY; HESSIAN FLY; MOSQUITO.

Diréc'tory (of France), the executive government of France, 1795-1799. In their fear of a monarchy, the people divided the executive power among five men, one to retire each year. The Directory was unpopular and corrupt in both domestic and foreign affairs, but the military successes of the first years of its rule kept it in power. The losses during Napoleon's absence in Egypt made it easy for him to overthrow the Directory when he returned.

Discor'dia, or **E'ris**, evil-working daughter of Nox, and sister of Nemesis, the Fates and Death, was expelled from Olympus by Jupiter because of the strife she stirred among the gods. In revenge for not having been invited to the marriage of Peleus and Thetis, she threw among the guests the golden apple that caused the Trojan War.

Diseases of Plants, fungus or bacterial growths that hinder the development of plants. The former are themselves plants and may be saprophytes, living upon dead animal tissue, or parasites, living upon living tissue (See FUNGUS). Bacteria are minute animal organisms that are better known as causing disease of higher animals (See BACTERIA). Other causes which prevent the proper growth of plants are faulty conditions of moisture, poor soil and insect pests. See FUNGICIDE; INSECTICIDE; WILT; RUST; MILDEW; PHYLLOXERA.

Dis'infec'tant, a substance capable of destroying harmful bacteria and of cleansing places where bacterial decay has taken place. It differs from an antiseptic in not being designed for use upon living bodies; hence substances which would be harmful as antiseptics may be used as disinfectants. The best-known disinfectants are extreme heat, formaldehyde, carbolic acid, potassium permanganate, chloride of lime, sulphurous

acid and soda. Many so-called disinfectants are really deodorizers and serve merely to prevent the passage of germs through the air, or to cover an unpleasant odor by means of a stronger and more agreeable one.

Disk Harrow, or Disker. See HARROW.

Dis'mal Swamp, a large swamp of southeastern Virginia and of northeastern North Carolina. It occupies much of the counties of Nansemond and Norfolk of the former state and of Gates and Camden of the latter. It covers an area of 300 sq. m., most of which is thickly overgrown with cypress, cedar and other forest trees. Lake Drummond lies in the northern part of the swamp, and a canal from Chesapeake Bay to Albemarle Sound intersects it and gives passage for schooners.

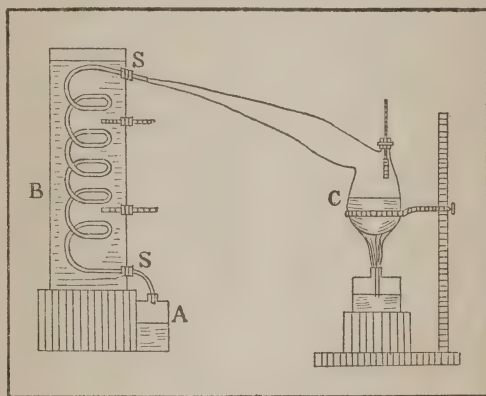
Disper'sion of Light. See COLOR, THEORY OF; LIGHT.

Disraeli, Dis'ra'ly, Benjamin, EARL OF BEACONSFIELD (1804-1881), a British statesman and prime minister of England, politician and novelist. He was born of Jewish parents, but was baptized in 1817, when his father and mother became members of the Church of England. In 1827 he published *Vivian Grey*, which proved the most popular novel of the season. Three satires soon followed, together with other novels and a poem, the *Revolutionary Epic*. He then turned to politics, beginning as a Radical candidate. His *Letters of Runnymede*, published in the *London Times*, and attacking the Whig leaders, finally drew attention to him, and he entered Parliament for Maidstone in 1837. The next year he married the widow of his colleague, Lewis. He now published five more books, three political novels and two love stories.

In 1846 he became leader of the Conservative Party and held the position for 25 years. He was made chancellor of the exchequer three times, and was prime minister in 1868 and again from 1874 to 1880. Now that he had reached the goal of his ambition, his early zeal for reform had cooled. He was more interested in

extending the empire and in pursuing a spirited foreign policy. In 1876 he was created Earl of Beaconsfield. Two years later he intervened successfully between Russia and Turkey, and took part in the Treaty of Berlin. In the new Parliament of 1880 there was a large Liberal majority. He resigned from the cabinet, but continued to lead his party. As a writer, Disraeli is chiefly noted for his faithful portrayal of the English aristocracy. He was a great debater and a master of wit and sarcasm, a tactful manager of men and unswerving in reaching his goal.

Dis'tilla'tion, the process of converting solids or liquids into vapor by means



STILL

of heat, and condensing the latter in a receiving vessel called a condenser. This process is generally carried on by means of an apparatus constructed upon the plan given in the accompanying cut. The heat is applied to the vessel C, containing the substance to be distilled, and the vapor which is evolved passes through a tube SS, kept cool, generally by means of flowing water in the tank B. The vapor condenses in the tube and passes into the receiver A, in liquid form. Such an apparatus is called a still.

Fractional distillation is a process similar to the above, but acting upon the principle that different substances vaporize at different temperatures. In this process, the mixture is subjected to a definite heat at which the more volatile gases pass off and are condensed. The temperature is then raised, and those of

higher critical, or gas-forming, temperatures are collected in a second condenser. This process is made use of in the distillation of petroleum in the production of benzine, naphtha, etc.

Destructive distillation takes place when the substance to be distilled changes its characteristics upon the application of heat. When this process is carried on without the use of water or any dissolving liquid, it is also spoken of as dry distillation. It is used in the manufacture of charcoal from wood.

Distilled Liquors, alcoholic liquors produced by the combined processes of fermentation and distillation. They may be made from fermented materials or directly from raw substances which contain large quantities of starch or sugar. Brandy is distilled from wine. Rum is made by fermenting and distilling molasses, while whiskey is produced from grains containing starch. Distillation may be performed to produce either a raw spirit or an alcoholic beverage. The intoxicating beverages made in ancient times were obtained by fermentation. Although the people had some knowledge of distilling in the third century, the art as applied to the manufacture of liquors is first mentioned in the tenth century by the Arabians, and at that time the term *aqua vitæ* (the water of life) was given to strong alcoholic drinks.

In the process of manufacture an endless variety of materials is employed; however, the essential element which must be produced in all cases is alcohol. As in brewing, making the wort is necessary when grains like barley, oats and rye are used. In order to convert all the starch contained in the grains used into sugar, the process of mashing is essential as the first step. This is performed by grinding and boiling. The next step is fermentation, which is started by adding yeast, and requires from three to nine days. In some distilleries hydrofluoric acid is used during fermentation for producing an increased yield of alcohol and preventing foaming, but in making alcohol from beets, sulphuric acid is used instead. The process of fermenting is

carried to its farthest limit in order to produce the greatest amount of alcohol, and the liquid thus prepared is known as a wash. This is put in the still, when it is reduced to a vapor by heat and then condensed in a spiral tube called the worm. The first product of a still is a weak and often impure liquid known as low wines, and this is redistilled at low temperatures. The final process is that of purifying liquors. Brandy, rum and whiskey owe their flavors to essential oils produced in making them, but in distilling, other impurities, often noxious and unwholesome, pass over, and these must be removed by further and repeated distillation, technically known as rectifying the spirit. See **ALCOHOL**; **RUM**; **BRANDY**; **WHISKEY**; **WINE**; **BEER**; **DISTILLATION**.

Dis'tribu'tion, in political economy the apportioning of wealth among those engaged in its production. The agents engaged in the production of wealth are natural agents, such as land, water and air, capital, labor and government. In a perfect system of distribution each of these should receive its just share of wealth. In economics, distribution is considered under rent, interest, wages and taxes. See **RENT**; **INTEREST**; **WAGES**; **TAX**.

District Court. By the act of 1789 the states of the United States were divided into judicial districts, each district having a judge, a marshal and an attorney appointed by the Federal Government. The District Court has jurisdiction largely over cases connected with the revenue laws, proceedings in bankruptcy, admiralty matters, cases arising under the postal laws and criminal prosecution for Federal law violation. Appeals may be made from the District Court to the Circuit Court of Appeal, and in important cases from that court to the Supreme Court. There are one or two District Courts in each state and three in some of the most populous ones, and the number is increased from time to time as the increase in population requires. In 1920 the number was 103. The salary of a district judge is \$7500.

District of Columbia, the seat of the general Government of the United States. It was provided for by acts of Congress, July 16, 1790, and March 3, 1791, pursuant to the Constitution, which provided that Congress was to "exercise exclusive legislation in all cases whatsoever over such district (not exceeding ten miles square) as may by cession of particular states and the acceptance by Congress, become the seat of Government of the United States." Immediately after the close of the Revolution there was much discussion about the location of the permanent seat of government, and finally in 1790, after the claims of New York, Philadelphia, Annapolis and Baltimore had been considered, Congress decided that after 1800 the Federal capital should be moved to the district "not exceeding ten miles square" on the Potomac River at the head of deep-water navigation. The requisite territory was offered to Congress by Maryland in 1788, and by Virginia in 1789, the tracts being located opposite each other with the Potomac River between. By proclamation of President Washington both offers were accepted. In 1846 as no government buildings had been erected on the Virginia side, and the city was more compact than it would be if on both sides of the river, that portion of the territory was returned to Virginia, leaving about 70 sq. m. in the District.

The government of the District of Columbia is under the executive control of three commissioners appointed by the president and confirmed by the Senate. Two of these commissioners must be citizens of the District of at least three years' residence, and one is detailed from the army engineering corps. All legislative powers are in the hands of Congress, however, so in effect the committees of the two houses having the affairs of the District in their control are its real governors.

In 1871 the District was made into a territorial form of government by the request of its citizens, who thought they were entitled to a degree of self-government not previously accorded them. In

1874, however, Congress repealed these acts, owing largely to extravagance in pushing public improvements by the officials, and it was decided that as the District was set aside solely for the Federal Government, control should be invested entirely in Congress through whose authority the commissioners should act. The population of over 300,000, of whom the greater proportion reside in the city of Washington, have absolutely no voice in the management of affairs, being disfranchised in all general elections. Half of the expenses of the District, however, are paid by the National Government as the owner of more than half the real estate.

In 1890 the section known as Georgetown was merged with that of Washington and the city of Washington is now coextensive with the District of Columbia. See WASHINGTON, D. C.

Di'ver, a name given to such birds as the loons and grebes, which have a strong, straight bill, short legs with web feet and short wings and tail. They are helpless on land and are indifferent flyers, but the best of swimmers, diving with great ease. Their food consists of fish. See GREBE; LOON.

Divides, or **Watersheds**, in physical geography, the elevations between two or more drainage systems. The crest of a mountain ridge forms the most effectual divide. In the United States the Rocky Mountains constitute the great continental divide, separating the areas drained into the Pacific and into the Gulf of Mexico respectively. The numerous subordinate water partings between the smaller streams of a drainage system are called subdivides. Watersheds are often difficult to trace, as those between the branches of the Missouri, those of the Saskatchewan and those of the central plain of Ireland, where they are marked only by a gentle slope. A divide may be destroyed by the work of running water. Two mountain streams, with sources adjacent but flowing in opposite directions, may become united by erosion or the wearing away of the land at their heads until a pass is formed. Other alterations

in sheds sometimes result from earth movements. In some remote geological period Lake Huron and the Georgian Bay discharged into Lake Ontario through an outlet across the province of that name; but an upheaval of the land in the area crossed by this outlet formed an effectual shed, diverting these waters into other channels. See NIAGARA FALLS AND RIVER.

Div'ina'tion, the act of divining or foreseeing secret or future things by supernatural means. The ancients understood by *natural* divination those predictions effected by divine inspiration. *Artificial* divination they believed was effected by special rites, by omens and by such observations as the flight of birds, the position of stars and the appearance of the entrails of animals. The latter sort of divination was successfully practiced by the medicine men of the American Indians.

Di'ving, the act of working under water either with or without a supply of air. In the Indian Seas and other tropical regions natives dive to great depths and bring up pearls, corals and sponges, and it is said they can remain under water for two or three minutes. Mechanical contrivances of various sorts are now employed, especially where the work requires the men to remain any length of time under water. The diving bell is one of the oldest of these devices, and it was used in quite ancient times in a crude form. It is a large bell of cast iron, having a shelf or seat within, on which the diver can sit. When lowered in the water, the air in the bell keeps out the water, and the lower down it goes the greater is the pressure of the water, so that the air in the bell is compressed into a smaller space. By means of a rubber tube attached to the top of the bell and connected with a force pump, fresh air can be continually supplied, while another arrangement is made for the foul air to escape.

The diving dress, or armor, is now in very general use. It consists of a rubber suit, with a metal helmet having eye-pieces of glass in front. Lead soles are

fastened to the shoes in order that the diver may sink, and a tube is attached to the helmet through which air may be pumped to him by assistants on the surface, and all superfluous air is made to escape through a valve in the helmet. Lines of rope are carried down by the diver for signaling. Other forms of armor are used for special purposes. In going down the diver may suffer severe pain in the eyes and ears, but when he reaches bottom this ceases. Divers work at depths of 150 ft. with safety, and can remain under the water for several hours. Modern suits are supplied with tanks containing oxygen, and also a device by means of which the suit can be quickly inflated with air, so as to bring the diver to the surface.

Recently a submarine sledge has been invented. The sledge is towed by a motor boat, with which the diver is connected by telephone. By means of vertical and horizontal rudders the sledge can be directed upward or downward and to the right and left. It conveys the diver rapidly from one place to another and is of great assistance in searching for lost torpedoes and locating submarine mines.

Division of Labor, the simplification of a long process by dividing it among many laborers, each of whom has his own part to perform. In highly civilized communities this process has been carefully though unconsciously developed, since it saves time and energy and insures greater skill in each department of work. This lowers the cost of production and increases the producing capacity of each workman; it has also been the means of stimulating invention, since it centers the attention upon one line rather than distributing it over many. The highest degree of perfection in the division of labor has been reached in the manufacture of boots and shoes.

Divorce', the dissolution of the marriage contract by a competent legal authority and for causes that have arisen since the marriage contract. A dissolution of the contract for causes existing previous to marriage, such as marriage

of one of the parties to a third person, is known as *annulment*. In nearly all countries the power of granting divorce is vested in the courts. In some cases it may be granted by legislative enactment, though in most states of the United States this is prohibited by law. Previous to 1858 divorces in England could be granted only by act of Parliament. In that year the Matrimonial Causes Act went into effect and vested certain courts with power to grant divorce. In the early history of the colonies, divorce was granted by the Legislatures, but, later, authority to grant divorce was conferred upon courts of record.

The laws governing divorce are widely different in different states. South Carolina has no law allowing divorce to be granted. Nevada allows the granting of divorce after six months' residence of one of the parties and for a large number of causes. Between these extremes are many grades of restriction. In some states there is no restriction to the divorced parties' marrying; in others, one, two, three or five years must elapse before they can marry. When divorced, the wife is usually granted a stipulated sum, payable at regular intervals during the life of the husband, or until she marries again. This is known as alimony. The causes for which divorce is usually granted are adultery, abandonment, habitual drunkenness, imprisonment for felony, desertion, failure to support, cruelty and incompatibility of temperament.

The ratio of divorces in the United States is on the increase. The wide variation of laws in different states makes it possible for divorces to be granted in one state when they cannot be procured in another, and many people desiring to be divorced become temporary residents of those states whose divorce laws are lax. Owing to the evils arising from this practice, there is a growing demand for the enactment by Congress of a national divorce law that shall be uniform throughout the country. The Roman Catholic Church regards marriage as a sacrament and does not sanction divorce under any circumstances, and its clergy

will not marry those who have been divorced. A number of Protestant churches also regard marriage as a sacrament, but consider divorce justifiable in extreme cases. The clergy of some refuse to perform the marriage ceremony if one of the parties has been divorced. See MARRIAGE.

Dix, John Adams (1798-1879), an American soldier and statesman, born in Boscawen, N. H. He was educated in Montreal and Boston. In 1812 he was appointed cadet in the army, and was promoted to a captaincy in 1825, resigning his commission in 1828 on account of ill health. Meantime he had been admitted to the bar, and he now began the practice of law, removing to Albany in 1830. In 1833 he was appointed secretary of state for New York, the same year was elected to the Legislature, entered the United States Senate as a Democrat in 1845 and became secretary of the treasury in Buchanan's cabinet in 1861. At the beginning of the Civil War he joined the army as brigadier-general and was made major-general of volunteers in 1861. Later he was commander of the Department of the East. In 1866 he became minister to France, and was elected governor of New York as a Republican in 1872. He was a friend of education and commercial progress, and was the author of several books.

Dixie, or Dixie's Land, a term applied to the Southern States. Its derivation is obscure but it is claimed to have originated near New York, where a man named Dixie owned many slaves. Owing to the growth of anti-slavery sentiment in the North and because slave labor was becoming unprofitable on his estate, Dixie sold a large number of slaves to Southern planters. When obliged to remove to the South the slaves grew to look upon their old home as a sort of paradise and celebrated it in their songs. In time the name of Dixie's Land was transferred to their new homes and became a term for the South among the whites as well as the negroes.

Dix'on, Ill., a city and county seat of Lee Co., 98 m. w. of Chicago, on the

Rock River, about 65 m. above the junction of that river with the Mississippi, and on the Illinois Central, the Chicago & North Western and other railroads. The town has manufactories of agricultural implements, wagons, shoes, screens, flour, wire, cement, lawn mowers and condensed milk. The Rock River Assembly meets here annually. Dixon was settled in 1836. Population in 1920, 8,191.

Dixon, Thomas (1864-), an American novelist and playwright, born in Shelby, N. C. After graduating from the Greensboro (N. C.) Law School, he was admitted to the bar. He was a member of the North Carolina Legislature in 1885-6, but in the latter year resigned to enter the Baptist ministry. He has been a popular lyceum lecturer. Among his writings are *The Leopard's Spots*, *The One Woman*, *The Clansman*, *Comrades* and *The Sins of the Father*. In 1905 *The Clansman* was dramatized and produced in New York.

Dnieper, Ne' per, a river of Ukraine. It rises in the swampy regions of the Government of Smolensk, flows south and southeast and empties into the Black Sea below Kherson. When not ice-bound, the river is navigable almost its whole length of over 1400 m. It receives the Beresina, the Pripet, the Psiol and the Sozh rivers, and communicates with the Baltic Sea through the Beresina Canal. The commercial importance of the river is significant and there is an abundance of fish in its waters.

Dniester, Ne' ster, a river of Europe, having its source in Galicia in the Carpathian Mountains. After a course of 850 m., between Roumania and Ukraine, it empties into the Black Sea. Through improvements made by the Russian Government, the numerous shallows and rapids of the river no longer impede navigation, and the Dniester is now of commercial importance.

Dob'son, Henry Austin (1840-), an English poet and critic, born in Plymouth. His poetry is spontaneous, bright and happy; his prose, delicate; his criticisms, sympathetic and sound.

He has published volumes of poetry including *Vignettes in Rhyme*, *Old World Idylls* and *At the Sign of the Lyre*. His prose includes *Eighteenth Century Vignettes*, *The Paladin of Philanthropy* and biographies of Fielding, Steele, Goldsmith, Hogarth and Walpole.

Dock, a nautical term, usually referring to a deep-water wharf where facilities are given for loading and unloading large ships. A dry dock is a basin or inclosure of special shape, whose entrance can be closed and from which the water can be pumped so as to leave the vessel's hull dry, that it may be examined, cleaned, repaired or painted. A wet dock is an inclosure surrounded by quays, whose entrance is closed by a gate, and in which the water level is so controlled as to be always at the same height. A tidal dock is a similar basin, open to the sea, in which the water level changes with the tide.

A floating dock is built like a large scow or flat-bottomed boat and contains large water-tight compartments, which rise on each side above a space in the center large enough to contain a ship or boat. One end of this inclosure can be opened and closed by gates. By filling the compartments with water, the floating dock is lowered so that the ship can enter. The gates are then closed, and the water is pumped out of the compartments, allowing the dock with the ship to rise. The water is drained from the central space and the floating dock becomes a dry dock. Several dry docks of this type receive ships over 500 ft. long, which is the limit for the *Dewey*, now in use in the Philippines, but its lifting capacity of 16,000 tons is unequalled. The *Dewey* was constructed in 1905 at a cost of \$1,124,000, and is in three sections, either of which can be floated separately when repairs upon it are necessary.

The most important dry docks on the Atlantic coast are at Portland, Portsmouth, Brooklyn, Elizabeth, Philadelphia, Wilmington, Baltimore, Newport News, Norfolk and Port Royal. A large floating dry dock is located at New Orleans, while on the Pacific coast there are dry

docks at San Francisco and Port Orchard. On the Great Lakes dry docks are located at West Superior, Marquette, Milwaukee, Chicago, Port Huron, Cleveland, Toledo and Buffalo. Many docks are maintained all over the world by the British Government and shipowners, among which are those at Hongkong, Cape of Good Hope, Halifax, Gibraltar, Malta and Bermuda. At Dover, in Great Britain, docks 780 ft. long, built of stone and concrete and costing a vast amount, have been recently built for a landing stage for the cross-channel traffic.

Dod'der, a slender, twining plant of the Dodder Family, which grows as a parasite upon other plants. Since it obtains its sustenance from the branches upon which it grows, the dodder is entirely without green leaves; in fact the whole plant resembles a tangled skein of yellowish yarn as it spreads over herbs and bushes. The flowers are generally white and grow in loose clusters. The calyx is a tiny, four- or five-lobed cup, and the corolla is either tubular or bell-shaped, often found remaining at the base of the ripened pod. Dodder, though a native of Europe, is found flowering throughout June and July on shrubs and tall herbs of our marshes or lowlands from New York south and west as far as the Rockies. It is said to injure the growth of flax upon which it is frequently found, but upon other host plants is not harmful. A coarse, matted, dodder, less common than other species and having bunches of stemless flowers, lives upon goldenrod and other composite plants in the Valley of the Ohio.

Dodge, Doj, Grenville Mellen (1831-1916), an American soldier and civil engineer, born in Danvers, Mass. In the Civil War he joined the Federal army, was in command of a brigade at Pea Ridge, was major-general of volunteers after the engagements at Sugar Valley and Resaca, and succeeded General Rosecrans in command of the Department of Missouri. As chief engineer he superintended the construction of the Union Pacific and the Texas Pacific railroads. In 1867-69 he represented Iowa in Con-

gress. In 1898 he was appointed chairman of the commission to inquire into the charges of mismanagement in the Federal War Department during the Spanish-American War.

Dodge, Mary Abigail (1830-1896), an American author known as Gail Hamilton, born in Hamilton, Mass. She taught physical science in the high school of Hartford, Conn. While governess at Washington in the home of Gamaliel Bailey, the editor of the *National Era*, she became a regular contributor to that periodical. Later she edited *Our Young Folks*. Among her light and attractive works are *Gala Days*, *Woman's Wrongs*, *Battle of the Books*, *Sermons to the Clergy*, *Our Common School System* and *Country Living and Country Thinking*. She also assisted in writing the *Biography of James G. Blaine*.

Dodge, Mary Elizabeth Mapes (1838-1905), an American editor and author, born in New York City. Shortly after marrying William Dodge, a lawyer, she was left a widow, and then she engaged in literary work, becoming one of the editors of *Hearth and Home*. She met with success as editor of *Saint Nicholas*, also as a writer of juvenile fiction. Her works include *Hans Brinker; or, The Silver Skates*, *Theophilus and Others*, *Donald and Dorothy*, *The Land of Pluck*, *Along the Way*, *When Life is Young* and *Poems and Verses*.

Dodgson, Doj' son, Charles Lutwidge (1832-1898), an English author, better known by his pen name of Lewis Carroll, born in Daresbury. He studied at Oxford and took deacon's orders in 1861. From 1855 to 1881 he was engaged as mathematical lecturer at Christ Church, and revealed the acute and ingenious thinking of a scholar of high rank. He published *Euclid and His Modern Rivals*, *Syllabus of Plane Algebraical Geometry* and *An Elementary Treatise on Determinants*. His subtle fancy and lively imagination, however, found best expression in the unique volumes, *Alice's Adventures in Wonderland* and *Through the Looking-Glass and What Alice Found There*. He also

wrote *The Hunting of the Snark*, *Sylvie and Bruno* and *Sylvie and Bruno Concluded*.

Do'do, an extinct bird related to the pigeons. It was restricted to the Island of Mauritius and became extinct during the latter part of the 17th century through its persecution by the early Dutch voyagers who used it as food to provision their ships. The dodo is known only from the descriptions and paintings of the voyagers who described it as being a bird larger than a swan, with very short legs, a large neck and head, with a very large bill, hooked at the end. The wings were small and the bird could not fly. Its general color was gray, the wings and tail being yellowish and the breast brownish. The feathers of the body were soft and downy.

Dog, the name of one of the important and universally known animal families, but more familiarly used to designate the domesticated genus of the family. The family includes such animals as the wolf, jackal and fox, all highly carnivorous and having a more or less pointed muzzle, strong teeth, a tail of moderate length, and forefeet fitted with five claws, while the hind ones have but four; these claws are not retractile as are those of members of the Cat Family. All members of this family, when young, seem to enjoy human attention and petting and are easily tamed. Since earliest times members of the now domesticated genus have been the friends and companions of men whether in Arctic regions, torrid or temperate zone; their sagacity, endurance and speed have made them invaluable assistants, and their loyalty, constant affection and unselfish devotion have never been excelled and seldom equaled among human kind.

Because of differences of environment, crossbreeding and a natural working out of the old law of the survival of the fittest, many breeds of dogs have developed, varying in different countries and adapted to different purposes. There are certain characteristics common to the silken lapdog and the noble St. Bernard; for instance, all dogs have the well-

known habit of digging up earth with their forefeet and throwing it back with their hind feet; before lying down they turn around several times, a habit which was probably a necessity to their wolf-like ancestor who had to tread down his bed or carefully look for a lurking enemy before lying down to sleep. The superficial variations of color, form and size are, however, almost endless among the 200 species of domesticated dogs, and a complete classification is hardly possible; a convenient arrangement groups them in the following classes: *Wolflike Dogs*—shepherd dogs, Arctic sledge dogs, etc.; *Greyhounds*—all greyhounds, Irish wolf dogs, deerhounds, lurchers, etc.; *Spaniels*—all spaniels, Newfoundlands, poodles, setters, retrievers, St. Bernards, etc.; *Hounds*—bloodhounds, foxhounds, beagles, pointers, Dalmatian coach dogs, etc.; *Mastiffs*—bulldogs, mastiffs, Great Danes, boarhounds, pugs, etc.; *Terriers*—Scotch, English and Irish terriers, fox terriers, skye terriers, etc. Many of these species are treated under their respective titles. Some authorities believe that the domesticated dog is a civilized descendant of the wolf tribe, but the majority find indications that the two animals are close kin but of separately developed lines.

When living seems but little worth
And all things go awry,
I close the door, we journey forth—
My dog and I!

For books and pens we leave behind,
But little careth he,
His one great joy in life is just
To be with me.

He notes by just one upward glance
My mental attitude,
As on we go past laughing stream
And singing wood.

The soft winds have a magic touch
That brings to care release,
The trees are vocal with delight,
The rivers sing of peace.

How good it is to be alive!
Nature, the healer strong,
Has set each pulse with life athrill
And joy and song.

And ere we reach the busy town,
Like birds my troubles fly,
We are two comrades glad of heart—
My dog and I!

Alice J. Cleator.



REPRESENTATIVES OF THE DOG FAMILY

Fennec
Spitz
Foxhound
Jackal
Wolf

Gray Fox
Bull Terrier
St. Bernard

Red Fox
Fox Terrier
Pointer
Dingo
Coyote

Dog'bane, or **Dog's Bane**, a native American shrub of the Dogbane Family, growing near meadow borders. The leaves are light green and opposite each other on the branch, which terminates in a cluster of pale pink, bell-shaped flowers appearing in June and July. The bell is slightly five-parted and traced with deeper pink lines. The fruit is a long, awkward pod and is often found at the same time as the flowers. The juice is milky and bitter but not poisonous as was once supposed. It is now used for medicinal purposes.

Dog Days (Canicular Days), about 40 of the hottest days of the year. At the time when the Egyptians and Ethiopians reckoned their year from one rising of Sirius (the Dog Star) to the next, the rising of the star corresponded with the rising of the Nile and occurred in the midst of their 40 hottest days. These were called dog days from the Dog Star, to whose influence they attributed the heat and disease of the period. The term has come to be applied to the hottest days of the year without regard to the rising or influence of the Dog Star. See **SIRIUS**.

Dog'fish", a large fish of the Shark Family, common in European waters and, in certain species, in the United States. The dogfish have long, somewhat cylindrical bodies, fleshy, unsymmetrical tails and large mouths with protruding upper jaws. Their flesh is coarse and unpalatable; hence they are not caught for food but for a valuable oil, which is obtained from their livers. They prey upon smaller food fishes and are known as the scavengers of the sea. The American dogfish is from one to three feet long and is somewhat spotted.

Dog Star. See **SIRIUS**.

Dog'tooth Spar, a variety of the mineral calcite, so called because its crystals resemble a dog's tooth.

Dog'wood", or **Cor'nel**, an American tree belonging to the Dogwood Family and having a small prototype in the bunchberry of our Northern woodlands. The dogwood is a small tree, with a smooth stem and the smaller branches

marked with long, uneven lines. The flowers appear in May before the leaves, and present a most beautiful appearance in the spring woods. In the South, where it occurs commonly, large areas are covered with these trees; in the North it is less common, but perhaps for this reason more admired. The flowers are small and yellowish, but are surrounded by four petal-like leaves called bracts, which are often mistaken for true petals. The leaves, which unfold as the flowers fall, are oval, shiny green in color, though inclined to be lighter and downy underneath. The fruit is a bright



DOGWOOD

red berry or bunch of berries, which remains on the tree through the most of the winter.

The wood of the dogwood is fine-grained, hard and white and used for fine cabinetwork. The bark is of value in medicine, being used in preparation of tonics. There are many varieties of dogwood, all of which are ornamental trees. The American variety is said to blossom at the exact time for planting Indian corn.

Dol'drums. See **CALMS**, **REGIONS OF**.
Dole, Nathan Haskell (1852-), an American author, born in Chelsea, Mass., and educated at Harvard. He successively taught school, was literary and musical editor of the Philadelphia

Press and associated himself with various publishing houses. Among his writings are *Not Angels Quite*, *The Hawthorn Tree*, and *Other Poems* and *Omar, the Tentmaker—A Romance of Old Persia*. He has translated from the Russian, Polish, German, French, Spanish, Italian, Swedish and Danish, and has edited widely poems and encyclopedias, with a variorum edition of *The Rubáiyát of Omar Khayyám*, which has parallel translations in various European languages.

Dole, Sanford Ballard (1844-), an Hawaiian statesman, of American parentage, born in Honolulu. He graduated at Williams College, Massachusetts, was admitted to the bar in 1873 and returned to Hawaii the same year. In 1887 he was appointed judge of the Hawaiian Supreme Court. After the Revolution of 1893 he was made president of the Hawaiian Republic. He visited the United States in 1898, and when Hawaii was organized as a territory of the United States in 1900, he became governor. He resigned in 1903 and became United States district judge of the territory.

Dol'lar, the unit of currency in the United States and Canada. The name is derived from the German *thaler*, a contraction of *Joachimsthaler*, which was the name of large silver coins struck by the Count of Schlitz in Joachimstahl, Bohemia, in the 15th century. At the time of the Revolutionary War in America, the Spanish dollar was much in circulation in the colonies. The coinage act of Congress in 1792 fixed the value of this at 24.75 grains pure gold, and authorized the coinage of silver dollars "of the value of a Spanish milled dollar, the same as is now current." The first actual coinage was in 1794. This dollar weighed 416 grains and had a fineness of .8924. In 1837 it was changed to 412.5 grains, .900 fine, at which it still remains. The coinage of this dollar was discontinued by act of Congress in 1873, and "trade dollars" of 420 grains each were authorized for the trade with China and Japan. These were discontinued in 1878 and the coinage of the silver dollar of 412.5 grains was resumed, and was continued

by the act of July 14, 1890. On March 3, 1849, Congress authorized the coinage of gold dollars, weighing 25.8 grains each, .900 fine; this was discontinued in 1890. In August, 1886, the issue of dollar "silver certificates" of paper was authorized, secured by silver dollars held in the United States Treasury. The gold dollar was made the standard of value in the United States by act of March 14, 1900, but no coinage of it was authorized. A dollar is worth 100 cents, and is equivalent to about 5.18 French francs, Spanish pesetas or Italian lire; 1.94 Russian rubles; 3.73 Danish, Swedish or Norwegian crowns; 4.2 German marks; .205 English pounds sterling. See *MONEY*, subhead *Coinage*; *MINT*.

Döllinger Dul'ing er, Johann Joseph Ignaz (1799-1890), a German theologian and historian, born in Bamberg, Bavaria. After studying at Würzburg, he took orders in the Roman Catholic Church in 1822, and four years later became professor of ecclesiastical history and law in the University of Munich. He entered the Bavarian Parliament in 1845, and was a zealous leader of the party favoring the separation of the Church and State. In 1861, after having visited Rome, he announced a change of views, declaring that the temporal power of the pope was not an essential part of the Roman Catholic Church. He refused to accept the doctrine of the infallibility of the pope, advanced by the Vatican Council in 1870, and was excommunicated by the Archbishop of Munich. His popularity did not suffer, however, and in 1871 he was elected rector of the University of Munich. He founded the "Old Catholic" movement and presided over its congress. Among his writings are *The Treatise on the History of the Church*; *The Reformation, Its Interior Development and Its Effects*; *The Church and the Churches*; and *Materials for a Life of Bellarmin*.

Doll'iver, Jonathan Prentiss (1858-1910), an American statesman, born in Kingswood, W. Va. He graduated at the University of West Virginia in 1875, was admitted to the bar and removed to

Iowa, in 1878, where he built up an extensive law practice and entered upon an active political career. From 1888 to 1900 he served as a Republican in Congress, and was then appointed United States senator to fill the unexpired term of John H. Gear, being reelected for the terms 1901-07 and 1907-13. In the Senate he was a leader of his party and gained prominence as an orator and debater. He was especially conspicuous as an advocate of governmental control of railroad rates.

Dol'omite, or Magnesian Limestone, a carbonate of calcium and magnesium, ranging in color from white to gray, yellowish-white, yellowish-brown or reddish, and having a pearly luster. It occurs massive and in crystallized form. The former class includes pearl spar; the latter, which is frequently colored, includes brown spar, and a reddish variety containing cobalt and manganese. Calcined, or roasted, dolomite yields a cement which is used extensively for linings of Bessemer converters; and the mineral when treated with sulphuric acid produces calcium and magnesium sulphates used in the manufacture of Epsom salts. Dolomite occurs as a rock and also in loose masses in various parts of Europe and the United States. The compact varieties resemble limestone and are used for building purposes. The Houses of Parliament, London, and St. Patrick's Cathedral, New York, are built of dolomite.

Dolphin, *Dol' fin*, a family of aquatic Mammals belonging to the same class, the Cetacea, as the whales. They have smaller heads than the whales and different arrangement of the teeth. Of the genus Dolphin there are many species, found in all of the larger seas. The common dolphin is found in the Northern Hemisphere; it is about seven feet in length and is recognized by its snout, which is extended in a long beak. It is sociable in habit, and schools of dolphins follow ships, playing and racing through the water in their wake. The flesh of the dolphin was once highly prized as a food but is now used only by

the Laplanders. One species of this genus has been especially celebrated because of the beautiful colors which it assumes when dying. Byron refers to it when he says,

"Parting Day

Dies like the dolphin, whom each pang imbues

With a new color as it gasps away

The last still loveliest, til—'t is gone, and all is gray."

Other members of the Dolphin Family are the porpoise, narwhal and grampus, all widely known since earliest times. See PORPOISE; NARWHAL; GRAMPUS.

Domes'day, or Dooms'day, Book, a book containing a survey of the lands in England, compiled about 1086 by the order of William the Conqueror. It is one of the oldest and most valuable of England's historical records. The survey was made by commissioners who collected in each district from a sworn jury, information concerning the extent, tenure, value and proprietorship of the land and a classified census of the people, together with the conditions in each town or shire. The origin of the name is a matter of dispute, but it is supposed to come from the Anglo-Saxon *domas*, meaning laws.

Domes'tic Science. As the science of household economy, this subject, in its broadest sense, includes for the more advanced students a study of house plans and house decorations, heating, ventilation and all that serves to make for better sanitation and more hygienic living. In a narrower sense it includes the study of foods, their chemical constituents, relative values and preparation, and their adaptation in a well-balanced diet to the needs of the individual, as modified by the requirements of his occupation. Domestic science is commonly supplemented by such courses in domestic art as are of most vital importance in the home life, such as sewing, dressmaking, millinery, and laundering in all its phases. In the grammar and high schools of some cities, courses which treat of the bathing, dress, food and care of little children have now been added.

Domestic science was recognized by the earliest American colleges for women as an essential part of that liberal education for which they stood. The land-grant colleges of the United States recognized from the beginning that courses in domestic science are of quite as much importance for the mistress of the farm home as courses in soil-physics and the chemistry of soils can be for the farmer. The normal schools of the country, seeing that teachers of domestic science would ultimately be demanded by the common schools, gradually introduced such courses for those who cared to elect them; and the colleges of liberal arts were at last forced by public opinion to include this subject, at least as an elective, in their courses for women. Meantime, many technical schools which had opened their doors to women had developed courses of the greatest value. Thus a considerable corps of trained teachers has gradually been developed, and common and high schools, finding domestic science popular, have included it in their courses.

Since the beginning of the 20th century the introduction of domestic science into the schools, as well as higher institutions of learning, has been rapid. Most of the normal schools of the country maintain courses designed to prepare teachers for this work in elementary schools, and universities and technical schools maintain extended courses which prepare teachers for filling positions in normal and high schools. The American Home Economics Education Association, organized in 1908, has done much to advance the teaching of domestic science in the United States, and the International Congress on Home Education is exerting a similar influence in other countries.

Dom'nic, Saint (1170-1221), founder of the Dominican Order of monks, born in Calahorra, Spain. In childhood he practiced self-denial and gave signs of extraordinary piety. He studied at the University of Palencia and was later ordained priest. Passing through the southern part of France, he became interested in the conversion of the Albigenses,

among whom the legates of the Pope had already labored without avail. He worked zealously among them but was not rewarded with great success. He withdrew to Rome in 1215 to obtain permission to found an order of preachers. Three years later a papal bull was issued, recommending to Catholic bishops the Order of Friars Preachers. The movement spread to all parts of western Europe and friaries were established with extraordinary rapidity. See DOMINICANS.

Domin'ical Letter, or Sunday Letter, one of the seven letters A, B, C, D, E, F, G used to mark the Sundays throughout the year. The first seven days of the year are marked by these seven letters, and each succeeding seven days by the same letters throughout the year. As there are 52 periods of seven days in a common year, and one day over, the letters go backward one letter every common year and two letters on leap year. For example, in 1911 the dominical letter was A, in 1912, G; but as 1912 was leap year, after Feb. 29 it was F. The letter assists in determining on what day of the week a day of the month will fall in a given year. Rules and tables are given for finding these days in prayer books and in the best almanacs.

Domin'icans (Friar Preachers), a mendicant order of great learning and virtue, called Black Friars in England and Jacobins in France. It was founded by St. Dominic (1170-1221 A. D.), a noble Spaniard, to counteract the teachings of the Albigenses and Waldenses, who were disturbing southern France. When sanctioned by Innocent III (1215), the order adopted the monastic rule of St. Augustine. Questing was included in the Friars' religious duties, as were midnight prayer and complete abstinence from meat. The Roman Catholic Church has never been better served than by the early Dominicans, who performed great missionary works, not by preaching alone, but by eloquent precept. The most distinguished Dominican was St. Thomas Aquinas. The Order of Dominican Nuns was established for women. Tertiary or-

ders were also created for the laity. Besides a large number of canonized saints, this order has contributed to the Church three popes, 60 cardinals, 150 archbishops and about 800 bishops.

Dom'inoes, games, partly of skill and partly of chance, played by from two to ten or twelve persons, on any firm and smooth surface, with all, or a given portion, of 28 thin rectangular pieces of wood, bone, ivory or other substance. These pieces are themselves called dominoes. On one side they are plain, and usually black, like a domino. The other face of each is divided by a line into two squares. Seven pieces represent the double-blank, double-one, etc., to double-six; others represent the blank-one, blank-two, etc., to blank-six; while the remaining 15 show all the possible combinations of the figures one to six. The dominoes are first shuffled face downward upon the table. Then each player draws the number required. The leader plays one of his pieces face up on the table, perhaps the 5-5. The next then plays adjacent to this, perhaps the 5-2; while the third must play on one end a piece which will match the 5-5, or, on the other end, a piece which will match the 2, as, for example, the 2-1. In some games all exact combinations of five or multiples of five, found by counting the ends after each play, are recorded as made, and the game may be 100, 200 or 500. In other games it is the principal purpose of each player to block the game for others, while keeping pieces with which he himself can play successively until his supply is exhausted. Some sets of dominoes include the 7-7, 8-8 and 9-9, the blank-seven, blank-eight and blank-nine, and 21 others which represent the additional combinations, made possible by the introduction of these three figures. Rules for the many different games may be found in Hoyle, or in Spalding's *Home Library*.

Don, a river of southern Russia. Rising in Lake Ivan-Ozero, in the Government of Tula, it flows to the southeast, describes a large arc across the Province of the Don Cossacks and emp-

ties into the Sea of Azov at the town bearing the same name. It is over 1150 m. long and is navigable for 800 m. A canal connects it with the Volga, and its tributaries are the Sosna, Donetz, Voronezh, Medvyeditsa and Manitch rivers. The traffic of grain, cattle and lumber on its waters is heavy, and the fisheries are extensive.

Don''atel'lo, or **Donato**, *Do nah' to*, (about 1386-1466), an Italian sculptor of the Florentine School and the most important sculptor of the early Renaissance. His father was Niccolò di Betto Bardi, a wool comber, who placed his son at an early age in a goldsmith's workshop. While still a youth Donatello formed a fortunate friendship with Brunelleschi, the sculptor and architect, and together the two journeyed to Rome for the purpose of studying antique works of art. This sojourn was the most important influence in the young artist's life and prepared the way for modern sculpture, of which Donatello, more than any other, may be considered the founder. He never slavishly followed classic models, but was original and even revolutionary, preparing the way for Michelangelo, his lineal descendant in art. After his return to Florence he executed a number of works which show a mingling of Gothic and classic influences. He designed numerous pieces which were executed by his pupils.

Donatello was one of the most prolific of Renaissance sculptors, and his industry received a rich reward. Chief among his works are *St. Peter*, *St. Mark* and *St. George*. The necessity for assistance led to a partnership with the architect and sculptor Michelozzo, and during the eight years of this association they executed jointly several notable monuments and other pieces. During a second visit to Rome, Donatello carved a ciborium for the Sacristy of St. Peter's and a *Burial of Christ* in relief. Returning to Florence in 1434, he made for his patron, Cosimo de' Medici, a colossal *David*, which was followed by the group *Judith and Holofernes*, the first nude statue of the Renaissance. In 1444 he was called

to Padua to prepare the statue of Erasmo de' Narni, known as *Gattamelata*. This was the first bronze statue since antiquity, and is one of the greatest equestrian statues of the Renaissance.

The work of Donatello is marked by vivid realism and dramatic power. These qualities, together with an excellent technique, perfect mastery in the treatment of relief and flesh, make this artist one of the greatest sculptors of all time. He left a large and important school which exercise a potent influence upon Italian painting.

Don Car'los (1788-1855), second son of Charles IV and pretender to the Spanish throne. He had been considered the heir of his brother, Ferdinand VII; and when Maria Isabella became queen after the death of Ferdinand, Don Carlos tried to secure the throne. In 1845 he gave up his right of succession to his sons.

Donkey. See *Ass*.

Don'nelly, Ignatius (1831-1901), an American congressman and writer, born in Philadelphia. Removing to Minnesota in 1856, he became lieutenant-governor of that state, served in Congress and in the State Legislature. He took a prominent part in the Populist movement. In *The Great Cryptogram* he attempted to prove that Francis Bacon was the author of Shakespeare's plays. He also wrote *Atlantis, the Antediluvian World, Cæsar's Column and Ragnarök*.

Dono'ra, Pa., a city of Washington Co., on the Monongahela River and the Pennsylvania Railroad, 35 m. s. of Pittsburgh and 21 m. e. of Washington, the county seat of the county. It lies in the midst of a region rich in coal and in natural gas and has varied manufactures. Among these are steel, zinc, muriatic and sulphuric acid. The public school system is excellent and up-to-date. Population in 1920, United States Census, 14,131.

Don Quixote, Don Kwik' sote, or Don Ke ho' ta, a famous Spanish novel by Miguel Cervantes, published in two parts, in 1605 and 1615, respectively. The book was written to ridicule the popular romances of chivalry of the time, which

had become tiresome absurdities. It relates the adventures of a gallant knight, Don Quixote, who, accompanied by his faithful servant, Sancho Panza, rides through the most dreary region in Spain. Don Quixote sees romance in the most ordinary situations and is constantly involved in all sorts of trouble. The book is, however, more than a parody on knight errantry. It gives an admirable picture of Spanish society of the 16th century, and the two leading characters are drawn with a skillful hand. Moreover, its wealth of humor, variety of incident, large humanity and searching criticism of life make it a book for all times and all nations. See CERVANTES SAAVEDRA, MIGUEL DE.

Doo'ley, Mr. See DUNNE, FINLEY PETER.

Doom Palm. See DOUM PALM.

Dop'pler's Principle, first stated in 1842 by Christian Doppler, an Austrian physicist. If a sounding body having a fixed pitch or frequency of vibration is approaching at considerable speed, as the whistle of a moving train, the apparent pitch of the note is higher than the true one; if it is receding, the apparent pitch is lower than the true one. The explanation is here given. When the sounding body is approaching the listener, each successive sound wave sent out by the vibrating body has a less distance to travel than the preceding one, before reaching the ear. Hence the intervals of time between successive waves reaching the ear are shorter than the intervals between the sending out of the same waves, thus causing the ear drum to vibrate more rapidly than does the sounding body. Likewise, when the sounding body is receding from the listener, each successive wave sent out by the vibrating body has a greater distance to travel than the preceding one before reaching the ear. Hence successive waves reach the ear less frequently than they are sent out, thus causing the ear drum to vibrate less rapidly than the sounding body.

If the pitch or number of vibrations per second of the sounding body is n , the apparent pitch is $n' = n \frac{v}{v \mp v'}$, where v is

the velocity of sound (about 1100 ft. per second) and V is the velocity of the sounding body toward the listener. In case the sounding body is receding, the relation is $n' = n \frac{v}{v+V}$. The corresponding relations for the case where the sounding body is stationary and the listener is moving toward or from it with speed V are $n' = n \frac{v+V}{v}$ and $n' = n \frac{v-V}{v}$, respectively. Even a moderate velocity of 50 or 100 ft. per second will cause the apparent pitch to differ from the true one by a half tone or more, a difference readily noticed by a trained ear.

The same principle applies to light waves. If a luminous body is moving toward the observer, more light waves reach the observer each second than are sent out by the luminous body in a second. As the sensation of blue is caused by light waves of greater frequency than red, the apparent color of the body would tend to be a little nearer the blue end of the spectrum than is the true color. But, owing to the enormous velocity of light (186,000 m. per second) compared with that of any known body, any change in color is far too slight to be detected. However, if the spectrum of a luminous body, as a star, moving toward the earth be examined, it will be found that all the lines (bright lines and Fraunhofer lines) in the spectrum are shifted slightly toward the blue end of the spectrum, as compared with the lines of a comparison spectrum produced by a stationary source of light in the laboratory. The astronomer measures these slight shifts and is thereby enabled to calculate the velocities with which the earth is approaching some stars and receding from others. In this manner it has been determined that our entire solar system is moving through space with a speed of 12.1 m. per second and nearly toward the bright star Vega in the constellation Lyra. See COLOR, THEORY OF.

Dor'chester Heights, an elevation to the south of and commanding the town and harbor of Boston, Mass. Washington, with 2000 men and a number of siege guns, quietly occupied it during the night

of March 4, 1776. For some reason Howe had neglected to take this position; but he now had to carry it by storm or evacuate Boston. He chose the latter alternative, after much deliberation, and on March 17 some 8000 British soldiers and 900 Tories were allowed to sail for Halifax.

Doré, Do ra', Paul Gustave (1833-1883), an eminent painter and designer, born at Strassburg, Germany. In 1848 he removed to Paris, where he contributed illustrations to various periodicals, afterwards engaging in book illustrating, in which he displayed an extraordinary facility as a draughtsman. Among the numerous works which he illustrated are Dante's *Inferno*, *Don Quixote*, the Bible, *Paradise Lost*, *Fables of La Fontaine* and Balzac's *Drole Tales*.

Do'rians, a name given by the Greeks to one of the chief groups of their race, to distinguish them from the Ionians and the Æolians. The Dorians claimed that they were descended from Dorus, a descendant of Hellen, who was the legendary ancestor of all the Greeks. About 1000 B. C. they overthrew the Achæan civilization in the Peloponnesus, and by 600 B. C. their chief strength was in the southern half of the peninsula, with Sparta as the leading Dorian state.

Do'ron, Sir Antoine Aimé (1818-1891), chief justice of the Province of Quebec. He was born in Champlain, Lower Canada. After his admission to the Montreal bar he gained a large practice. He represented Montreal, Hochelaga and Napierville from 1854 to 1874. He became prominent in the controversy over the union of Upper and Lower Canada, and in 1854 was chosen leader of the Liberal Party. Two years later Dorion offered a resolution in Parliament which embodied the principles upon which the Confederation was formed in 1867, but the resolution failed. Later he held the positions of provincial secretary, attorney-general and minister of justice. In June, 1874, he was appointed chief justice of the Province of Quebec.

Dor'mouse, a group of Rodents constituting a distinct family known as the

Dormouse Family. It is known in Europe, Asia and Africa but is not represented in the New World. In appearance it resembles a small squirrel, but it feeds by night and digs for itself a burrow which it lines with some soft, warm material that will form a comfortable bed; and a bed is its chief need, for the dormouse spends fully three-fourths of its life in sleep. Six months of the year, the coldest ones, it lies curled in a ball, with its tail tight over its head, and shows signs of life only by its loud, regular snoring, which may be heard fully 15 ft. away. Only the summer sun or warmth of fire will waken it to activity, and even then a sudden cold season will send it off to sleep again.

Dorr, Thomas Wilson (1805-1854), an American statesman, born in Providence, R. I. In 1833-37 he was a member of the Assembly of Rhode Island, and became the leader of a movement for the reform of the suffrage laws of the state. The party organized by Dorr in 1841 drew up a new constitution which received a majority vote, but was declared illegal. In the general election which followed both Samuel W. King and T. W. Dorr were elected governors, the election of the former being generally approved. Dorr resisted, was convicted of high treason and was sentenced to imprisonment for life, but was released in 1847. This disturbance was popularly known as Dorr's Rebellion, and Dorr and his followers were called suffragists. Although the attempt as such was a failure, it furthered the cause of securing a better government for the state. See RHODE ISLAND.

Dorr's Rebellion. See DORR, THOMAS WILSON.

Do'than, Ala., a city and the county seat of Houston Co., 119 m. s.e. of Montgomery, on the Central of Georgia, the Atlantic Coast Line and other railroads. The city is the commercial center for the extreme southeastern part of the state, which is engaged in agricultural pursuits. It has fertilizer, lumber, peanut and ice plants. There are several fine buildings and a public library.

Dothan was settled in 1885 and is administered under a revised charter of 1901. Population in 1920, 10,034.

Douai, Doo a', or Douay, Bible, the English version of the Vulgate text of the Scriptures used by the Roman Catholic Church. The work was done by learned men of Oxford. The New Testament was first published at Rheims in 1582; the Old Testament at Douai in 1609-10. Many revisions have been made since that time. These were necessary because of a too faithful adherence to the old text, which caused many Latin derivatives to be originally used that were not understood by the average reader.

Double and Multiple Stars, stars which are found upon observation through the telescope to consist of two or more distinct stars. Such a star may have no physical connection between its component stars, the stars being in the same line of vision but far apart; or the component stars may be near together and revolving about each other, being physically connected by the law of gravity. Multiple stars are composed of from two to seven or more stars, seen as one, until separated by the telescope. See STARS; SIRIUS; TELESCOPE.

Doub'leday, Abner (1819-1893), an American soldier, born in New York and educated at West Point. He served in the Mexican War, fought the Seminoles and was efficient in defending Ft. Sumter. In 1862, as brigadier-general of volunteers, he commanded the defense of Washington and subsequently participated in the second Battle of Bull Run, in Antietam, Fredericksburg, Chancellorsville and Gettysburg, at which latter engagement, upon the fall of Reynolds, he commanded his corps. As major-general, he retired in 1873. He wrote *Reminiscences of Forts Sumter and Moultrie in 1860-61* and *Chancellorsville and Gettysburg*.

Doub'le Refraction, the phenomenon, produced by many transparent substances, by means of which a beam of light entering them is not only refracted, or bent, as in the ordinary manner, but is divided into two beams. A substance

which does this is called a doubly-refracting substance. This phenomenon was first noticed in Iceland spar, a crystalline carbonate of lime, but has since been observed in many other crystals and in such animal substances as hair, quills, etc.; it may be produced artificially in glass by pressure or by heat.

If a doubly-refracting substance, as a crystal of Iceland spar, is laid over a cross marked on a piece of paper, two marks are seen through it. If the crystal is slowly rotated in a horizontal position, one mark will remain stationary and the other will appear to revolve around it. That ray showing the fixed mark, as it would be seen through a plate of common glass, is called the ordinary ray; the other ray, because of its unusual behavior, is called the extraordinary ray. If these two rays be tested by suitable means, it will be found that each ray is plane polarized, and that their planes of polarization are at right angles to each other.

If a ray of light passes through such a crystal parallel to the crystalline axis, that is, a line making equal angles with all the faces, double refraction does not occur; in any other direction, however, the phenomenon may be observed. Double refraction was first observed and studied by Bartholinus in 1669. See POLARIZATION OF LIGHT.

Double Standard. See BIMET'ALLISM.

Douglas, Dug' las, an ancient and celebrated family of Scotland. Their origin is unknown, William of Douglas being the first member of the family mentioned in history. His name frequently appears on charters from 1175 to 1213. Their estate in Scotland lay on the border, and they were soon recognized as the guardians of the kingdom, protecting the country especially from the encroachments of the Percies on the English border. Some of the important members of the family are the following: James, the son of William Douglas, the Good Sir James who fought side by side with Bruce at Bannockburn; James, second earl, slain in the Battle of Otterburn in 1388; Archibald, fourth earl, the

Douglas whom Percy defeated at Homildon in 1402; William, eighth earl, who defeated the English at Sark. After several generations the title passed to the third son of the first Marquis of Douglas, who was created Earl of Selkirk in 1646 and became third Duke of Hamilton ten years later. The line is now represented by the houses of Hamilton and Home.

Douglas, Stephen Arnold (1813-1861), an American statesman, born in Brandon, Vt. After getting what schooling he could while earning his own living, he studied law, obtained a license to practice in 1834, and settled in Jacksonville, Ill. He rose rapidly in his profession because of his ability and the publicity gained by his political activity. He was elected attorney-general of the state in 1835, at the age of 22, but resigned the same year to enter the State Legislature. In 1841 he was appointed secretary of state for Illinois; but resigned within a month to become judge of the State Supreme Court, and in 1843 was elected to the United States House of Representatives. He served in this capacity until 1847, when he was elected to the Senate, where he remained until his death.

Douglas came to be recognized as the leader of the Northern wing of the Democratic Party. He attained a high reputation as an orator, and this, in connection with his short compact stature, caused him to be popularly known as the "little giant." While opposed to slavery, he held that Congress had no right to restrict it to any section, but that the settlers of a given territory should decide the question for themselves; hence the expression "squatter sovereignty." He was therefore a strong advocate of the Kansas-Nebraska Bill, which applied this doctrine to the Territory of Nebraska, the Dakotas, Montana and parts of Wyoming and Colorado. This law greatly increased the anti-slavery agitation.

During the senatorial campaign of 1858 Douglas was opposed as a candidate by Lincoln, and the two held a famous series of joint debates in which was discussed with great ability on both

sides the whole subject of the extension of slavery, with the constitutional questions involved. Douglas was several times a candidate before the Democratic convention for the presidential nomination, and was nominated by the Northern wing of the party in 1860, the Southern wing withdrawing from the convention and nominating John C. Breckinridge. While in the election that followed Douglas received only 12 electoral votes, the popular vote for him was more than two-thirds as great as that for Lincoln. When the war broke out Douglas was a staunch supporter of the Union, but did not live to see its triumph.

Douglas Fir, an important timber tree of the Pine Family, found native in the Rocky Mountains. It is easily distinguished by its straight, scaly stem, which bears very short, horizontal branches that give to the tree an extremely narrow effect. At the top the stem is often almost bare and gives the impression of having a needlelike point. Like all firs, its leaves are awl-like and encircle the stem in a ragged arrangement. The cones are small, slightly oblong and stiff. The wood is so fine and strong that it is used for all kinds of building purposes, and the long straightness of the trunk renders them valuable as masts. Recently the Douglas fir has been introduced into the North Central States, where it seems to grow well.

Douglass, Frederick (1817-1895), an American lecturer and journalist, born in Tuckahoe, Md. His father was a white man and his mother a negro slave. In 1827 he was purchased by a Baltimore shipbuilder. In 1838 he made his escape, went to New Bedford, Mass., and was soon employed as a lecturer by the American Anti-Slavery Society. He visited England in 1845, and with the \$750 which his friends collected there he purchased his freedom. In 1870 he started the *New National Era*, in Washington, a journal devoted to the interests of the negro race. He became widely known as a popular lecturer, was secretary of the commission to Santo Domingo in 1871, presidential elector for New

York in 1872, marshal for the District of Columbia in 1876-81 and minister to Haiti in 1889. He wrote *My Bondage and My Freedom* and *Narratives of My Experience in Slavery*.

Doom Palm, or **Doom Palm**, a slender, much-branched tree of the Palm Family having small, deeply-lobed, fan-shaped leaves. The fruit is a nut which grows within a fibrous, mealy husk and has a horny, hard kernel, about the size of an orange. Both the kernel and the husk are eaten by the natives of northern Africa, where the palm grows. The tree is also called gingerbread tree because of the spicy flavor of the fruit.

Dove, *Duv*, a popular name applied to the smaller pigeons but having no zoological significance. It is used in literature rather more frequently than the scientific term *pigeon*. The various species are distinguished by the use of qualifying adjectives, as mourning dove, turtle dove, etc. The dove is the emblem of peace. See MOURNING DOVE; PIGEON.

Dovekie, *Duv'ky*, a bird of the Auk Family, about eight inches long, with black upper parts and white under parts. The wings and back have a few white marks. It has short legs and webbed feet, and is a good swimmer. It nests on the sea cliffs of Greenland and the adjacent regions, the single bluish-white egg being deposited on a rocky ledge or in a crevice. The nesting colonies number thousands of birds. The winter is spent in the open sea, and these birds are found as far south as the Azores.

Do'ver, Del., the capital of the state and county seat of Kent Co., 48 m. s. of Wilmington, on Jones Creek, 7 m. from Delaware Bay, and on the Philadelphia, Wilmington & Delaware Railroad. The city is situated in a noted fruit-growing region and has several fruit- and vegetable-canning and evaporating works. There are also planing and saw mills, foundries and machine shops, crate and basket factories and other industrial establishments. The Wilmington Conference Academy (Methodist), a state college and an agricultural and manual-training school for colored students are

located here. The public buildings include the State House, government post office and schools. There are monuments to persons distinguished in Revolutionary history. Dover was laid out in 1717 and became the capital of Delaware in 1777. Population in 1910, 3720.

Dover, N. H., county seat of Strafford Co., 10 m. n.w. of Portsmouth and 68 m. n.e. of Boston, on both sides of the Cocheco River, at the head of navigation, and on the Boston & Maine Railroad. The Falls of Cocheco, within the city limits, are the source of abundant water power. Dover has important manufacturing of boots and shoes, hats and caps, glue, sandpaper, oilcloth, castings, lumber, etc., and several large woolen and cotton mills. St. Joseph's School, St. Mary's School, Wentworth Hospital, a children's home and home for the aged are located here. There is a new High School with modern equipment and courses of study. The city is situated on hilly ground, is regularly laid out and has many handsome buildings and residences. Dover is the oldest city in the state. It was settled in 1623, organized as a town in 1633 and received a city charter in 1855. The town was nearly destroyed by the Indians in 1689. Pop. in 1920, 13,029.

Dover, N. J., a city of Morris Co., 12 m. n.w. of Morristown and 28 m. w. of Newark, on the Rockaway River, on the Morris and Essex Canal and on the Delaware, Lackawanna & Western and the Central of New Jersey railroads. Near by are Lake Hopatcong, Budd's Lake, Mt. Arlington and Schooley's Mountain, all noted summer resorts. Five miles distant is a government powder magazine. The city is well laid out and has many fine residences. Dover has extensive iron interests, railroad shops, furnace and range works and silk and hosiery mills. Population in 1920, U. S. Census, 9,803.

Dover, Strait of, a narrow channel connecting the English Channel and the North Sea, and separating England from France, Dover and Calais being on opposite shores. It is from 1 to 20 fathoms deep. The shores, from 20 to 27 m.

apart, are formed by chalk cliffs. There is, perhaps, no busier maritime route in the world.

Dow, Neal (1804-1897), an American temperance reformer, born in Maine. In 1851 he was elected mayor of Portland, was reelected five years later, was a member of the State Legislature in 1858-59, and served in the Civil War. In 1880 he was the Prohibition candidate for president of the United States. He was the author of the Maine prohibitory law. He traveled extensively and became widely known as a lecturer and temperance reformer.

Dowden, Edward (1843-1913), an English scholar and critic, born in Cork, Ireland. He became professor of English literature at Trinity College, Dublin, and attained distinction through his scholarly writings, especially on Shakespeare. His works include *Shakspeare, His Mind and Art*, critical studies of Southey, Shelley, Wordsworth and Browning, *Transcripts and Studies, Studies in Literature* and *A History of French Literature*.

Dowie, Dow'g, John Alexander (1847-1907), an American religious leader and healer, born in Edinburgh, Scotland. Having been a pastor in Sydney, Australia, and having done evangelistic work in England and America, he settled in Chicago, in 1890, and made near-by Zion the headquarters of the Christian Catholic Church, which he subsequently established. At Zion, in 1903, one of the largest tabernacles in the world was erected. Dowie proclaimed himself Elijah the Restorer; but this claim, with his plan of spreading his power over the world, was set aside in 1906 by a revolt among his followers, who deposed him.

Doyle, Doil, Sir Arthur Conan (1859-), an English novelist, born in Edinburgh, Scotland. He was educated at Stonyhurst College, in Germany and at Edinburgh University. From 1882 to 1890 he practiced medicine in Southsea, but soon abandoned the profession for a literary career. After an extensive lecturing tour in the United States and Canada, he visited South Africa during the

Boer War, and wrote a defense of the British policy. He was knighted in 1902. He wrote *The Adventures of Sherlock Holmes*, and has lectured extensively on spiritualism.

Dra'co, an Athenian statesman who lived about 624 B. C. After a bitter rebellion headed by Cylon was put down, the frightened aristocracy of Athens yielded to the popular clamor and promised that the laws, hitherto unpublished and known only to the aristocracy, should be written and placed where all might read them. This task was assigned to Draco. When the laws were published and it was found that almost every offense was punishable by death, the people demanded new laws, and a little later the old laws, said to have been "written in blood," were replaced by the constitution of Solon.

Draft or Conscription, the names applied to the compulsory enlistment of men in the army. In all modern European nations, arrangements exist for compulsory military training so that when war breaks out, all of a certain age are liable and ready for service. Great Britain has formed the one exception to this rule but in the great war of 1914, conscription was employed. In the United States draft was resorted to in the civil war. When we entered the European War in 1917, it was at once seen that a very large army would be required. The first selective draft law of 1917 placed in one class all males between the ages of 21 and 31 inclusive. In August 1918, the age limits were placed between 18 and 45. Under this law enlistment ceased, but the men drawn for service and physically fit for duty can be assigned to any branch of service in which they may be needed.

Dragon Fly, a beautiful, gauzy-winged insect of the order Odonata. It is commonly seen darting in swift flight over the surface of small lakes and ponds, where it feeds upon mosquitoes and other annoying gnats and flies. The body of the dragon fly is long and cylindrical and fitted for quick turns and

rapid flight; the two pair of wings are well developed and of brilliant metallic colors.

The eggs are deposited in the water, where they hatch into large, aquatic animals resembling the giant water-bug. For a year they live in this state before becoming transformed into pupæ, which, unlike the pupæ of most insects, are active and voracious. When mature they climb to the summit of some reed or pond plant and there break through their imprisoning membrane, which is left clinging to the stem as the full-grown insect flies away.

The name dragon fly is extremely apt, for this insect is truly the dragon of the



DRAGON FLY

pond, although it is perfectly harmless to man, and even helpful to him. In some localities it is called the devil's darning needle from the superstition that it sews up children's ears, and in others it is known as the snake doctor because it is supposed to be able to bring to life a dead snake. Needless to say, these are only superstitions, and the actual powers of the dragon fly, its backward flight, its unerring swoop upon its prey and its beautiful, translucent coloring are far more wonderful than any fiction concerning it.

Drain'age, the removal, whether natural or artificial, of the excess of water from fields to increase their productivity. Natural drainage is by seepage, surface drains (as brooks and rivers) and subterranean drains. Like irrigation, the practice of artificial draining of fields

has been considered a necessity only in special instances, but the more recent idea is that even the most fertile fields occasionally require draining; this is because water is apt to stand in the subsoil even though the surface may be dry. Even irrigated lands require drains sometimes, because the moisture which is brought to the land is not carried off, but rather tends in its evaporation to bring alkali to the surface from a depth of several feet.

Some forms of artificial drainage are as old as agriculture itself. The earliest method was the digging of open ditches, into which the water drained and was so carried away. Later, covered drains were made by digging a deep trench, into the bottom of which pebbles and small cobblestones were placed and covered with earth. This method came into use in England about 1650 and is still employed there and in some parts of the United States. In place of pebbles, bundles of fagots, alder poles or even sod were frequently used. The first tile drains were made of the so-called horse-shoe tiles, which were buried in trenches like inverted U's. The drains most used at present are tubular tiles placed in the ground end to end, the whole line having a gradual slope. The ground water sinks in at the joints and is thence carried to the outlet. These tiles are generally laid from 3 to 5 ft. deep and from 15 to 100 ft. apart, according to the character of the soil to be drained. The first tiles for drains used in the United States were the old horseshoe tiles brought in 1835 by John Johnston, a Scottish farmer, for use on his farm near Geneva, N. Y.

The advantages of draining a field are numerous. Where there is a tendency for water to stand, weeds flourish though other vegetation fails. Drained fields may be cultivated earlier, since there is no waiting for them to dry out, and the ease of cultivating is increased. Seeds and young plants planted in drained fields are not in danger of being killed by too much moisture. Rain penetrates drained land more quickly, since there is

no water already standing in the soil; this is of double advantage, since the fresh rain brings in a certain amount of oxygen and nitrogen with it. Land from which the water is left to evaporate is colder than drained land, since the heat which would otherwise go into the soil is required to evaporate the moisture. Strange as it may seem, drained land is less liable to suffer from drought, for the roots of plants penetrate the soil more deeply and are not easily affected by surface drying. Drainage is best accomplished if the drains are laid at a depth of 5 ft., since water never enters the drain from below the bottom of the tile. The grade should be such as to give a maximum fall or else to change from a less to a greater so that clogging will be rare. The usual fall is a drop of two inches for 100 ft. of length, but falls of one-half inch for 100 ft. have proved successful. The systems of drains are various and differ with the character of the soil and the location, shape and size of the field. The distances between the trenches is determined by the freedom with which the water flows through the subsoil, the depth at which they are placed and the interval of time between heavy rainfalls. Lands that may be improved by drainage are those in which the water stands within 5 ft. of the surface at the close of a season of rainfall. For helpful articles upon drainage consult Storer, *Agriculture*; Bailey, *Cyclopædia of American Agriculture*; F. L. King, *Irrigation and Drainage*.

Drake, Sir Francis (about 1540-1596), an English navigator, born in Devonshire. From an early age he made his living upon the seas, and in 1567-68 was captain of a ship in the last expedition of Hawkins against the Spaniards. In 1572, with a force of three ships, he captured a Spanish town on the Isthmus of Panama, and priceless stores of treasure, took a Spanish galleon in the harbor of Cartagena and burned the town of Porto Bello. It was on this expedition that he first looked upon the Pacific Ocean. Drake's next notable exploit was his circumnavigation of the globe,

1577-1580. He sailed from Plymouth, England, for South America, reached the Rio de la Plata, then went south to the Straits of Magellan, entered the Pacific, and, after sacking the Spanish towns on the coasts of Chile and Peru, steered for the northeast. The crew objecting to the northern latitudes, Drake again turned south and sailed across the Pacific, finally anchoring off the coast of Java in March, 1580. He rounded the Cape of Good Hope on June 15, arriving at Plymouth, England, on Sept. 26, the first Englishman to sail around the world. Queen Elizabeth not only sanctioned her intrepid sailor's assaults on Spanish treasure, but even knighted him. Drake continued to be the terror of the Spanish and in 1588 served as vice-admiral under Lord Howard in the great sea fight that destroyed the Invincible Armada. His last undertaking was an expedition in 1595 to the West Indies.

Drake, Joseph Rodman (1795-1820), an American poet, born in New York City. Left an orphan at an early age, he struggled against poverty, but he succeeded in obtaining a medical education, and graduated in 1816. Two years later he went to Europe and when he returned he wrote witty and popular satiric verse called *The Croakers*, for the New York *Evening Post*, working with Fitz-Greene Halleck. He also published *The Culprit Fay and Other Poems*. His popularity rests largely on his best-known poem, *The American Flag*.

Drakensberg, *Drah' kenz berg*, a range of mountains of southern Africa extending in a northeasterly-southwesterly direction from Great Fish River in Cape of Good Hope to the Olifants, a branch of the Limpopo, in the Transvaal. It is a picturesque range and forms the watershed between the Orange and the Limpopo river systems. Its general elevation is from 10,000 to 11,000 ft., and it is about 500 m. in length.

Drama, *Drah' ma*, that form of literature which is designed for the representation of human character and actions, by means of actors, in the presence of an audience. The Greeks considered the

drama one of the divisions of poetry, but in the course of its development there have been plays written in prose as well as poetry. In every successful play we find the representation of the human will contending against certain opposing forces. This expression of the struggle of the human will against obstacles is the essential characteristic of a drama, whether in prose or verse. There are two general divisions of the drama, tragedy and comedy. In a tragedy the outcome is failure or defeat; in a comedy there is a successful or happy conclusion. The games, sports, dances and religious rites of all primitive peoples had dramatic elements, but the real drama begins with the Greeks.

ATHENIAN DRAMA. The Greek drama originated in the songs of the choruses who chanted lays in honor of Dionysus during the festivals celebrated in his honor. In the course of time spoken verses and dialogue were introduced. Thespis (506 B. C.) is said to have added an actor to the chorus. He was the founder of Athenian tragedy, though the earliest plays extant are those of Æschylus (525), who introduced a second actor and made the actors of equal importance with the chorus. Sophocles, the successor of Æschylus, was the most artistic of the Greek dramatists, and *Œdipus the King*, his masterpiece, is the crowning achievement of Attic tragedy. The last of the great tragic dramatists, Euripides, used the chorus to display his lyric ability and made it quite subordinate to the action of the play.

Like tragedy, Greek comedy had its origin in the worship of Dionysus, being a development of the fun and frolic of the harvest festival. The first of the great comic dramatists was Aristophanes, who combined in his plays, satire, caricature, burlesque, imagination, humor and poetry of a high order. Aristophanes was the representative writer of what is known as the *Old Attic Comedy*. In the fourth century came the *Middle Comedy*, and between 320 and 250 B. C., the *New Comedy*, the ablest exponent of which was Menander.

The work of this writer survives only in fragments, translations and imitations, but we know that the drama of his period is the forerunner of the modern comedy of manners. The chorus at this time had entirely disappeared.

The Greek drama is especially remarkable in that it represents the original work of a people who developed a great and artistic literary form entirely on their initiative, wholly unaided by outside influences. See ÆSCHYLUS; SOPHOCLES; EURIPIDES; ARISTOPHANES; THEATER.

ROMAN DRAMA. We know the Roman drama only in its late development, when it was a direct imitation of the Greek. Plautus and Terence were writers of comedy; Seneca, of tragedy. The Roman comedies exerted a great influence on the dramatists of the Renaissance, and the tragedies of Seneca were the chief classical models for modern writers of tragedy. During the later empire bloody spectacles took the place of the regular drama and with the establishment of Christianity, these, too, passed away. See TERENCE; PLAUTUS, TITUS MACCIUS.

MEDIEVAL DRAMA. With the decline of the Roman theater there came a long period of darkness in the history of the drama. Then a new dramatic form arose, having its origin in the services of the Church. The calendar of the Christian Church was so arranged that all of the chief events in the life of Christ were commemorated on certain days in the form of little plays. Gradually these were removed from the Church and were performed by secular actors instead of priests and in the language of the people instead of in Latin. There were three main forms of the medieval drama: the mystery play, which was a series of episodes taken from the Bible; the miracle play, a series of events taken from the life of some saint; and the morality, a play in which a moral lesson was presented by means of characters who personified various abstract virtues and vices. The morality was, in other words, a dramatized sermon. It was a definite step in the development of the regular

drama. The plot had to be invented, not taken bodily from the Bible.

ENGLISH DRAMA. The typical mediæval forms of the drama had a great vogue in England, but the revival of interest in classical learning in the 15th century gave a decided stimulus to the development of a regular drama. Students of the grammar schools began to present the comedies of Terence and Plautus under the direction of their masters. About the year 1536 Nicholas Udall, head master of Eton, produced the first English comedy, *Ralph Roister Doister*, a work of great importance in that it furnished a model to future playwrights. The tragedies of Seneca were also eagerly studied, and by 1561 the first regular English tragedy had appeared, a dignified work modeled on the classical lines, entitled *Gorboduc*. English dramatists, however, were not content to follow the classical rules, and in the course of its development the drama in England showed great freedom, both in construction and in language.

The first regular playhouse in London was erected in 1576 and by the end of the century there were 11 in and about the city. The theaters were round or octagonal in shape. The stage, which was open on three sides and extended out into the body of the house, was high enough for the main part of the audience standing on the bare ground, or "pit," to get a good view. Those who could afford it, sat in boxes built around the pit, while others sat on the stage itself. No actresses played at this period, women's parts being taken by boys. Although the costumes of the actors were elaborate, the stage furnishings were extremely meager.

In the latter part of the 16th century a group of poet-dramatists came to public notice, the first of those who helped to bring about the splendor of the Elizabethan drama. Of these, the greatest was Marlowe. The culminating achievement of the great period of dramatic activity was the work of Shakespeare, who began his literary career by working over old plays. His most striking literary

qualities, skill in the art of expression and matchless ability to depict human character, correspond to the two essential characteristics of the Elizabethan drama, its poetic quality and its character portrayal. Shakespeare shared with his contemporaries that freedom from restraint and rules that resulted in a general looseness of plot construction. Of Shakespeare's contemporaries, the greatest was Ben Jonson, a unique figure in the history of the drama, because of his adherence to the classical form and his opposition to the prevailing romantic tendency of his fellow dramatists. After the death of Shakespeare the drama began to decline, and in 1642 the Puritans closed the theaters. See MARLOWE, CHRISTOPHER; SHAKESPEARE, WILLIAM; JONSON, BEN.

The Restoration Period witnessed a revival of the drama, and such names as Wycherley, Otway, Congreve and Dryden made the period a notable one. Most of the plays of the time, however, were so coarse and corrupt that they cannot be read with any degree of pleasure. The moral tone of the drama began to improve toward the end of the 17th century. In the early part of the 18th century French influence was dominant, but the dramas produced are more interesting as literary productions than as suitable plays for the stage. Later, Goldsmith and Sheridan wrote comedies of manners still seen in theaters. Dramas continued to be written during the Romantic and Victorian periods, but none that could be successfully presented on the stage. At the present time there is a serious dramatic revival and a tendency to unite the literary and the acted drama; Henry A. Jones, Bernard Shaw, John Galsworthy, Sir Arthur Pinero and James Barrie are among the present-day English dramatists who are producing successful plays.

Dra'per, Andrew Sloan (1848-1913), an American educator, born in Westford, N. Y. From 1871 to 1886 he was actively engaged in politics, but his chief services were connected with the administration of American education. He was

a member of the board of education in Albany in 1879-81, again in 1890-92, was on the board of the New York State Normal School in Albany in 1882 and served as state superintendent of public instruction from 1886 to 1892. In 1894 he resigned his position as superintendent of the public schools of Cleveland, Ohio, to become president of the University of Illinois. He served in that capacity until 1904, when he was chosen commissioner of education for the State of New York. Among his numerous writings are *American Schools and Citizenship*, *American Universities and the National Life* and *Organization and Administration of the American School System*. He was also editor of the educational department of the *Encyclopedia Americana*.

Draper, John William (1811-1882), an American scientist, born in Lancashire, England. He came to America in 1831 and studied at the University of Pennsylvania, receiving the degree of M. D. in 1836. For over 35 years he was connected with the University of New York, acting as professor of chemistry and physiology and later as president of its school of medicine. His experiments with photography led to important improvements in the art. In 1839 he made portrait photography possible, and afterwards photographed successfully the surface of the moon. Among his numerous writings are *Text-book on Natural Philosophy*, *Human Physiology*, *History of the Conflict between Religion and Science* and *Scientific Memoirs*. His *History of the Intellectual Development of Europe*, in which he shows the influence of natural law on social advancement, was widely circulated.

Drave, Dra'h' ve, a tributary of the Danube rising on the eastern slopes of the mountains of Tyrol and flowing in a general easterly direction until it joins the Danube not far from the city of Esseg. The river is about 450 m. long and has been navigable to small boats for all but 100 m. of its length. Recent engineering operations are rendering the river useful to larger boats.

Drawbridge. See BRIDGE.

Drawing, the art of representing objects by means of lines and of shading. Formerly only lines were used in drawing, and distance was represented by foreshortening and perspective. Drawing is now taught in most schools in the United States and is designed not only to train the hand but the eye, the memory and the imagination. Pen and ink sketching, crayon and pencil work are the different kinds of drawing taught in common schools, and mechanical drawing is taught in connection with manual training.

Draw Poker, a game of cards which originated in the United States and was first played as a gambling game on the Mississippi River steamboats in 1860. A full pack of 52 cards is used, and it is played by any number of persons up to eight, though it is best to have six persons, which is termed a full game. Someone acts as banker, and from him the players buy chips, or counters, which are flat disks of ivory or pressed paper, and these, being of different colors, are made to represent different values, depending upon the size of the bets contemplated. The total amount of the purchase is called a stake. These chips are for convenience in betting, and are redeemed by the banker, usually at the end of the game.

The deal having been decided by cutting, or otherwise, the dealer shuffles the pack, which is then cut by the person on his right. Five cards are now dealt to each player one at a time, beginning on the left and dealing around towards the right. The person on the dealer's left is said to hold the *age*, he being the last man to say whether he bets or not; and for this privilege he is required to put up, or risk, a portion of his stake or a *blind* of, say, 15 cents, when the *ante*, or the privilege of coming in, is 25 cents. It is optional with the other players to come in, that is, elect to play by putting on the table the amount of the *ante* or *drop out* during this deal. The age man may also drop out, by forfeiting his blind, or he may increase the bet by *raising*.

This he does by adding, first, chips to make 25 cents in value, 10 cents of which is required to make good his 25 cents *ante*, and as much more for raising it as the limit of the game allows for, and all who desire to continue and draw cards must contribute the additional amount, which is termed *seeing the raise*. Any player has the privilege of raising the bet in this way, and it may be prolonged indefinitely by the players' raising back and forth.

After all who desire to play have contributed in the manner described, the dealer supplies them with cards as they call for them in substitution of whatever cards they may discard and put on the table face downwards. In this supplementary deal or in the draw no one can accept a card that is exposed, but must wait until all the other players have been supplied. The number of new cards drawn are carefully noted by each player, as it is a guide to the value of the hand. The hands rank in value as follows: no pair with ace at the head; one pair accompanied by three cards of different denominations; two pairs; triplets or threes of a kind, for instance, three queens accompanied by two other cards not forming a pair; straight, or sequence; a run of five cards, not all of the same suit, for example, ace, king, queen, knave and 10 being the highest hand, and 5, 4, 3, 2, ace being the lowest hand. The ace cannot be in the middle, for 3, 2, ace, king and queen is not a straight. Flush is five cards of the same suit not in sequence. Full, full hand or full house means three cards of the same denomination or triplets together with a pair, as three queens and a pair of tens; fours, or four cards of the same denomination, as four aces which beat four kings and under; straight or sequence flush, a combination of a sequence and a flush, as knave, 10, 9, 8, 7, of hearts; royal flush, or the highest possible straight flush, as ace, king, queen, knave and 10 of spades.

Sometimes the joker is used and this changes the value of hands considerably, as the joker may stand for an ace of any

suit as desired to complete a hand. When a player *improves* his hand by the draw and feels confident he has the winning hand, he bets the limit, and each player in his turn can *see it* or *call it* by putting up an equal amount. However, he too can raise the bet by wagering any amount up to the limit of the game. All hands called must be shown on the table.

The unlimited game of poker most generally played is known as *table stakes*. It is similar in every way to limited poker, except in the manner of betting. A player may bet everything he has in sight or on the table, and it requires a like amount on the part of the other players to *call him* or *see* the hand. This gives great opportunity for bluffing, though it is an expensive procedure when caught. Some games of poker are known as jack-pot poker, meaning there is no play until someone has at least a pair of jacks before the jack pot is *opened*, or the play begins. A *kitty* is the rake-off of the game for the expenses.

Various modifications of poker are played, one of which is *stud poker*, wherein there is no drawing of cards, but a bet is made on each card after two cards are drawn, the winner showing the best hand of five cards. Whiskey poker is played with an extra hand called the widow, which is dealt with the cards face downwards. Each player has, in turn, the option of taking up the widow and discarding his own hand, or passing. In case no one takes it up, it is exposed, and from it the players draw one card at a time to improve their hands. When a player is through drawing, he knocks on the table and the drawing ceases, except that every other player, in turn, may exchange one card or take up the entire hand. The party holding the lowest hand is penalized, and in a game of five people, five penalties usually constitute the loss of the game. See CARDS, PLAYING.

Dredger, *Drej' er*, a boat on which is located machinery to remove sand, mud and other materials from a body of water. It is largely employed for digging new channels, for deepening old

harbors and for removing obstructions to navigation. The most common form is the dipper dredge, which is similar to a steam shovel (See STEAM SHOVEL). Various forms of dippers or buckets are employed. The one generally used for removing loose material is like a clam-shell hinged at the back. A scoop dipper or shovel is sometimes employed. This is dragged over the bottom of a stream and its contents are deposited on the bank. A grappling bucket, shaped like the peel of an orange and in three parts, all hinged at the back, is useful in handling gravel and boulders and in lifting them in a vertical line. The dredger for removing soft materials, like mud and sand, where large capacities are required, consists of an endless chain carrying large, sheet-steel scoop buckets, supported by sprocket wheels and shafts. This operates in a well and is so arranged that its lower end drops into the water, and is raised or lowered by adjusting devices. This dredger is used in dredging gold-bearing sand and silt, on the coast of Alaska. Hopper barges are employed to receive and transport the material. Large centrifugal pumps are used to suck up and convey sand, and constitute a sand dredger.

Dred Scott Case, a case brought before the United States Supreme Court and decided by Chief Justice Taney in 1857. Because of its bearing on the slavery question Judge Taney's decision was at the time given great prominence. Dred Scott, a slave of one Dr. Emerson, an army officer, was taken by his master from Missouri to Rock Island, Ill., and later to Minnesota, where he married another slave of his master. Subsequently Emerson returned to St. Louis, where Scott was induced to sue for his freedom on the ground that his residence in a free state made him a free man. The local court sustained Scott, but the case was appealed to the Supreme Court of the state, which reversed the decision, and declared that a white man had a right to take his property into any state without jeopardizing his ownership. Meantime Scott was sold and taken to

New York, where he again sued for his freedom, and the case finally reached the United States Supreme Court, which sustained the decision of the Supreme Court of Missouri, deciding that a negro was not a citizen and therefore had no right in a law court. The decision was approved by the pro-slavery party; and condemned by the anti-slavery party.

Dreibund, Dri' boont. See TRIPLE ALLIANCE.

Dresden, Dres' den, a city of Germany, capital of the Kingdom of Saxony, situated on the Elbe River, about 71 m. s.e. of Leipsic. Overlooking it to the north are vine-clad hills, from which can be seen the green roofs of the palaces and the numerous towers and spires of the city, with its many objects of interest. The prominent buildings include 32 churches, many of them of magnificent architecture, the royal palace, the Zwinger, containing the museum and the famous picture gallery, the Brühl palace, the Japanese palace, the Hoftheatre in Renaissance style, the Academy of Fine Arts and the fine government buildings. The educational institutions are numerous; among them is the large Polytechnic School. The orchestra connected with the Court Theater is famous, for with it have been associated masters like Wagner, Reissiger and Weber. Augustus I founded the splendid picture gallery containing a magnificent collection of the world's masterpieces, chief of which is Raphael's *Madonna di San Sisto*. In all it contains about 2500 pieces. The museum contains about 400,000 specimens from different periods in the history of art.

The beautiful location of the city and the numerous art treasures attract a large tourist traffic, especially during the summer. The manufactures include china, gold and silver ornaments, perfumery, chocolate, cigarettes, paper, agricultural machinery and scientific instruments. The trade in books, art products, corn and liquors is extensive. Dresden (meaning forest dwellers) existed in 1206, was rebuilt after a devastating fire in 1491, and suffered heavy losses in the Thirty

Years' War, during Napoleon's occupancy of it in 1813 and during the political disturbances of 1849. Population in 1905, 519,996.

Dress, the covering which convention or the need of protection demands for certain parts of the human body. Although climate has been an important factor in the evolution of man's dress, it has been less a determining influence than the requirements of society for clothes for the sake of what is called "decency" and the inherent desire for personal adornment. In warm countries, for instance, and during the hot seasons in temperate countries, much more clothing is worn than is essential, while in some of the coldest regions, where the rigors of climate would seem to make necessary the use of several thicknesses of body covering, the natives are frequently found wearing the scantiest attire. The Eskimos of Arctic latitudes, both men and women, while heavily protected during exposure to the weather, with coats and trousers made of the skins of fur-bearing animals, go nude, or nearly so, inside their snow huts.

In warm climates, the first and simplest article of clothing to be invented by primitive man has always been the loin-cloth. This garment was worn by the ancient Egyptians, who have left the earliest pictorial records of this device, from which they developed a sort of skirt, reaching to the knees, and later a long tunic, extending from armpits to ankles. The earliest dress of the Babylonians of which we have record was also a covering for the lower half of the body. The Babylonians made use also of a long piece of fabric, which they wound about the body in such a way that the right arm and shoulder were left bare, while an end of the material was allowed to hang loosely over the left arm. From very early times the Persians have worn loose, baggy trousers, sometimes gathered in at the ankles, though this garment is supposed to have originated with the Chinese. Throughout the East differences in dress have nearly always denoted differences in caste or rank.

Among all the peoples of antiquity, the Greeks were the first to develop a mode of dress conforming in every respect with æsthetic principles. They wore few garments, usually one, never more than two, for in ancient times, indeed, until comparatively recent times, the best-dressed person never thought of wearing underclothes. Greek women wore the chiton, a kind of skirt, and the peplos, a loose, flowing garment, draped about the body and held in place by a brooch on the shoulder. The apparel of the men did not vary greatly from that of the women of the same class of society. Closely resembling the dress of the Greeks were the tunic and toga of the Romans, who, undoubtedly, copied their styles in dress, as in everything else, from their more gifted neighbors.

The early Germans, contrary to the usual practice throughout Europe, wore trousers, according to the historian Tacitus, who relates that the odd attire of these people impressed the Romans strangely at the time of the barbarian invasion of the Roman Empire in the third and fourth centuries of our era. The German women, however, dressed themselves in long robes, not unlike those of the Greeks and Romans. The conquest of Rome and the consequent mingling of the two races naturally had its effect upon the dress of both peoples; and in the centuries that followed we find a combination of the styles of both, but with striking modifications. This is seen in the dress of the Franks, in western Europe in the eighth and ninth centuries, which consisted of a skirt, reaching to the knee, supplemented by leg coverings, wrapped around the leg from the knee to the ankle. In eastern Europe the Byzantine influence upon dress was very marked. This influence showed itself in a greater elaboration of detail, the use of color and ornament and a sumptuous abundance of apparel for both men and women. It became very pronounced in the seventh century, and, spreading across western Europe, dominated the fashions, until, by the

time of Richard II of England and Charles VI of France, the dress of both sexes had become so voluminous as to be a burden. As these long robes were gradually discarded, men began to don the long tight stockings, reaching from waist to toe; and with the hose came the close-fitting garment, laced or buttoned to mid-thigh, which in its latest phases developed into the French *rochet*, or corset, the *cotte*, and finally into the doublet of the 15th, 16th and 17th centuries, the prototype of the modern waistcoat. All that was left of the long robe was an abbreviated cape, hung across the back, an appendage serving for ornament rather than utility. This costume—doublet and hose and cape—characterized the man of fashion of the Renaissance. A distinguishing feature of the dress of both men and women in the Age of Elizabeth was the ruff, a frilled collar, reaching from shoulder to ear and completely hiding the neck.

Although we have evidence that hats were worn by the Greeks, the custom was not general among the ancients; nor have we reason to suppose that other peoples of antiquity used such a head covering. The Roman citizen went hatless, but during the Middle Ages the cap or bonnet was not unusual; and in the 14th. and 15th centuries hats began to be manufactured in France and Germany and in the 16th century in England. From very remote times men have worn some sort of covering for the feet. Sandals were almost universal among the cultivated peoples of antiquity. It was an easy transition from this leather sole, held to the foot by straps, to the modern shoe.

In the 17th century trousers came into vogue in western Europe, and quickly passed through all the transformations that fashion could devise,—from long to short and from short to long, and embellished with all the frills and furbelows that the lace makers and manufacturers of gewgaws could invent and the vanity of man desire. Women's dress up to this time underwent few striking changes in its fundamental features. Sleeves, in-

vented by the Normans, changed from time to time as fancy dictated. The skirt, the distinguishing feature of the European woman's dress, has undergone a variety of modifications.

The tendency at the present time is toward world uniformity of dress. Styles in women's dress are fixed by costumers of Paris and Vienna and are marked by radical changes in detail from season to season. Men's fashions change less. The present style of men's clothing of the most advanced nations seems to have come to stay; and while it lacks the essentials of beauty, it has the virtue of a certain practicality. The great uniformity in dress seen today is one of the most interesting signs of the times, and when considered in connection with the dress of the Middle Ages, which was in nearly every case a symbol of class distinction, shows to what extent the amalgamation of all classes of society has advanced.

Drew, John (1853-), an American comedian, born in Philadelphia, Pa. He joined Daly's company in 1875 and acted for some time with Edwin Booth, Fanny Davenport and other prominent stars. His greatest success has been in rôles that playfully satirize society. He has played in *The Taming of the Shrew*, *The School for Scandal*, *The Masked Ball*, *The Butterflies* (with Maude Adams), *Rosemary*, *The Marriage of Convenience*, *One Summer's Day*, *The Liars*, *Richard Carvel* and *The Tyranny of Tears*.

Drex'el Institute of Art, Science and Industry, a coeducational institution established in Philadelphia in 1891 by Anthony J. Drexel. The purpose of this institution is similar to that of the Cooper Union, New York; namely, to provide instruction and training in the arts and sciences as related to the industries. It does not confer degrees. Its museum contains specimens from every part of the world, and illustrative of every department of industrial art. Instruction is given in science and technology; architecture; commerce and accounts; domestic science, art and economics; in library

methods, physical training and in the methods of teaching various technical branches. There are evening classes in all departments and free lectures and concerts that are of great value. The institute has an endowment of \$2,000,000 and expends about \$100,000 annually. Its library contains upwards of 40,000 volumes largely on technical subjects. There are approximately 3000 students. See COOPER UNION; ARMOUR INSTITUTE OF TECHNOLOGY; LEWIS INSTITUTE.

Drift, deposits that have been left by the melting of a glacier or the action of a river. The former is known as glacial drift and the latter as river drift. Glacial drift generally consists of sand, gravel and boulders and forms a compact mass in which the stones are often rounded and polished from the action of the ice. Such drift occurs in many mountain regions and in other parts of North America and Europe.

Dromedary, *Drum' e da ry*. See CAM'EL.

Drop'sy, an abnormal condition immediately due to defective heart action, but the primary cause of the disease is obscure. It is marked by an accumulation of the watery fluid of the blood in the serous cavities and subcutaneous tissues of the body. It occurs in a multitude of forms, sometimes being localized and again affecting the whole system by a general effusion. Insufficient strength of heart action or an obstruction which prevents the regular return of the blood to the heart makes it possible for the serum of the blood to pass through the weakened walls of the blood vessels and wander about in the body. See CIRCULATION; BLOOD.

Drown'ing, death by suffocation when air is kept from the lungs because the mouth and nostrils are immersed in some liquid. Since drowning usually occurs in streams, rivers or lakes, the first important consideration is this: How may a fair swimmer rescue another person from drowning?

(1) The swimmer must know how to protect himself, for if he cannot do this, the would-be rescuer is likely to be seized

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and dragged down by the person he desires to save. Figures 1, 2 and 3 show practical methods by which to break the hold of one who has lost his self-control.



FIGURE 1

The nose of the drowning person being closed with a firm grip, he naturally opens his mouth. The water then causes him to choke; and while he is choking, a sudden push with the arm or knee, or with both, is almost certain to break his hold.

(2) To avoid the death-grip of a drowning person and make every ounce of energy count in getting him quickly to land, the rescuer should seize him from behind, as shown by Figure 4; and, if there is a strong current, he should then



FIGURE 2

work out of it gradually so as to avoid undue exhaustion.

(3) Having landed the victim, the rescuer must proceed to efforts for his

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resuscitation. He can do the most essential work alone and should do it at once. (a) Loosen the victim's clothing or strip him to the waist. Place him face downward, with one of his arms under his forehead. Under the pit of his stomach place a roll of clothing, or some other material, so as to raise the stomach above the head and permit the water to drain slowly out of the mouth. Pressure upon the back, from the waist toward the shoulders, will tend to expel water from the lungs. Cleanse the mouth, then draw the tongue forward and fasten it with an elastic band or strip of cloth, tied under the chin. (This prevents the closing of the air passages, which will



FIGURE 3

be closed if the tongue falls back into the pharynx.) These things can be accomplished in a very few minutes.

(b) If assistants appear, they should aid by covering the limbs with warm blankets, by rubbing from the feet toward the body to stimulate circulation, by applying warmth to the soles of the feet and to the abdomen and by quite warm rectal irrigations of salty water. Until regular breathing is reestablished, no restoratives should be given through the mouth.

(c) Meantime, after removing the roll of clothing from under the body, one person swaying his body slowly forward,

and then backward, should exert a firm, but not violent, pressure 12 or 15 times a minute upon the lowest ribs. This movement should be kept up for at least half an hour, unless natural breathing is sooner restored, the hands being kept

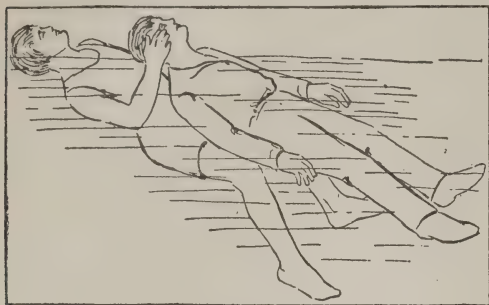


FIGURE 4

constantly in position on the lowest ribs. This is the simplest and most effective method of restoring natural respiration, and it need not necessarily be preceded by the other treatment above suggested.

The shock incident to an unexpected fall into the water, and particularly into very cold water, sometimes stops the heart action at once. Ordinarily the heart continues to beat for 10 to 15 minutes after one is submerged in water, but convulsive attempts to breathe continue only about half that time, and complete insensibility probably results within one or two minutes after the air supply is cut off.

Drug'gist, a name commonly applied



FIGURE 5

to a person who operates a shop where drugs are sold, but technically referring, in the United States, to a person, who, by passing certain required examinations, has shown himself familiar with

the dangerous and the salutary effects of drugs and their combinations. Each state regulates for itself the control of such examination, which is generally done through a board of pharmacy, and adopts its own drug acts. Often graduation from an accredited school of pharmacy and the consequent passing of examinations there are the only requirements. Druggists in the United States are variously called apothecaries, pharmacists or pharmaceutical chemists. In England the single term *chemist* is frequently used.

Drugs, an indefinite term applied now to any substance which is used in the preparation of medicine, whether for internal or external use. Once the name referred particularly to substances employed in dyeing but its use in that sense has entirely disappeared. In a popular way the word *drug* also is applied to such chemicals as opium, morphine, etc., that are taken to produce a stimulating effect, and their constant use is known as the drug habit. To be exact in the use of the term, one must apply it only when the use of the chemical is definitely medical; hence chemicals which are at times drugs, at other times are not properly so-called.

Dru'ids, the priests of the ancient Celtic nations of Gaul, Britain and Germany, who combined the functions of the priest with those of the magistrate, scholar and physician. Their relationship to the Celts was much like that of the Brahmans to the people of India. The Druids taught the existence of one God and identified their supreme deity with the sun, but according to Latin writers they also worshiped many inferior gods. Fire they regarded as a symbol of their chief divinity. Their ceremonies of worship were conducted in a circular area, from 20 to 60 ft. in diameter, whose circumference was marked by a line of stones. These sacred areas were usually near some stream or under the shadow of a grove or wide-spreading oak. The oak, as well as the mistletoe which grew on it, and the mountain ash were sacred to them. The Cromlech, or

stone altar, stood within the center of the circle. Large stones or piles of stones placed on the summits of hills, and called Cairns, were also used as places of worship. Of the ceremonies connected with the religious services almost nothing is known, but the Roman writers state that they offered human sacrifices on especially important occasions. The Druids held two great annual festivals: one, in the beginning of May, was in honor of the sun; the other, on the first of November, was for the purpose of settling all judicial matters. The history of the Druids consisted of traditional tales, probably in verse, which recounted the heroic deeds of their forefathers. Nothing of their doctrine or history was ever put into writing. When the Romans under Julius Cæsar invaded the island they began the extermination of the Druids, the survivors of whom retreated to the islands of Anglesea and Iona. The circles of stones at Stonehenge, England, long supposed to be ancient Druidical remains, are now thought by some scientists to be the work of a people who preceded the Druids.

Drum, a musical instrument of the percussion order. The ordinary drum is of cylindrical shape with the two flat surfaces or heads covered with parchment, held in place by an arrangement of bands and cords, which can be tightened or slackened to regulate the tone. The parchment surface is struck by sticks held in the hands of the performer. See KETTLEDRUM.

Drummond, Henry (1851-1897), a Scottish biologist and evangelist. He was born at Stirling, was educated at the University of Edinburgh and at New College, Edinburgh. He took part in the evangelistic work of Moody and Sankey, and was chosen as a lecturer on the natural sciences in the College of the Free Church at Glasgow. In 1884 the position was raised to a full professorship. He traveled extensively, visiting the United States three times and lecturing, during his visits, on scientific and religious subjects. His *Natural Law in the Spiritual World* was published in 1883

and reached its 29th edition in ten years. This work is an attempt to reconcile the doctrines of Christianity with the theory of evolution by arguments based on analogy. A year later Drummond published *The Ascent of Man*, in which he tries to prove that evolution is a part of Christianity by showing that the spiritual emotions have their course of development as well as the forms of life in the natural world. He has also written an interesting book on *Tropical Africa* and a number of shorter works, among which is *The Greatest Thing in the World*.

Dry'ads, wood nymphs of classic mythology. The ancients believed that a dryad came into existence with each tree, made that tree her abode and perished when the tree died.

Dry Bat'tery. See ELECTRIC BATTERY.

Dry'den, John (1631-1700), an English dramatist, poet and critic, born at Aldwinkle, in Northamptonshire. He studied at Westminster School under Dr. Busby, and it is thought that he spent three more years at Cambridge, after taking his degree there in 1654. Removing to London, he published his first volume, *Heroic Stanzas*, in 1659. His marriage with Lady Elizabeth Howard took place in 1663, in which year he also began his career as a dramatist with the performance of the *Wild Gallant*. During the 20 years which followed he wrote a great number of plays, many of them acted with marked success. He was appointed poet laureate in 1670. After a while he abandoned the use of the heroic couplet in drama, though he had staunchly defended it and written satiric attacks on Shakespeare's blank verse. On the accession of James, in 1685, Dryden became a Roman Catholic; the sincerity of this change of religious views has been the subject of much dispute. With the Revolution of 1688 he lost his position as laureate and his income, and retiring to quiet life he produced some of his best work. He lies buried in Westminster Abbey.

Dryden was a critic and a reformer of prose. His *Essay of Dramatic Poesy* is

a complete statement of his views on the use of the heroic couplet and is a masterpiece of criticism. As a prose writer he is lucid and precise. He made able translations of the classics, rendering works from Ovid, Vergil, Horace, Lucretius and Theocritus into English. His poetry—the *Ode on St. Cecilia's Day*, or *Alexander's Feast*, is the best known—rises to noble heights, but the artificial standards of which he approved deadened much of the fire and inspiration of his song. In satire his attacks were sweeping and hard. *Abraham and Achitophel*, *The Medal*, *Religio Laici*, *Mac Flecknoe* and *The Hind and the Panther* are the works in which he expresses his bitter disapproval of and vigorously combats the political and religious views of his time. His dramas, of which several belong to the type known as "heroic," include *The Maiden Queen*, *All for Love*, *Antony and Cleopatra*, *Don Sebastian*, *Troilus and Cressida*, *Love Triumphant*, *Tyrannic Love*, *Almanzor and Almahide* and *Aureng-zebe*. Dryden stood at the beginning of the great Classical age as it was manifested in the poetry of England. He had something of the spirit, the spontaneity and the fire of the earlier age, but he aimed first and last at correctness, at formality and prosaic ideals.

Dry-Farm'ing, a system of farming whereby a profitable crop is produced without irrigation in arid or semiarid regions. It is generally necessary to use methods of dry-farming wherever the annual rainfall is 20 inches or less or in regions where the seasonal distribution of rain is very unequal. Its purpose is the reclaiming for agricultural purposes of the nonirrigable arid regions which have been supposed to be necessarily barren. The important problems of dry-farming are: the storage in the soil of small rainfall until it can be used by plants; the prevention of evaporation of moisture during the growing season; the regulation of the amount of water taken up by plants; the choice of suitable soil for dry-farming; the proper treatment of crops; and the disposal of the crops, which are of better composition than

those raised under humid conditions and hence seek a different market.

The experiments which have led to the great interest in this new industry, have shown that ten inches of rainfall is, if properly conserved, sufficient to produce 25 bushels of wheat per acre, and, with 12 inches, 30 bushels per acre can be easily produced every other year. There are at present in the United States 1,861,652 sq. m. of arid, subhumid and semiarid land located in some 18 states, chiefly in the West. Taking out of this the timbered land and the mountainous and desert lands, there are left some 600,000 acres, which may be used for agricultural purposes, and out of this only five per cent of the land is available for irrigation. This shows something of the possibilities of dry-farming in the United States, and conditions are similar in many other countries.

The principles and processes of dry-farming are here given briefly. The farm should be located in a region where the precipitation is more than ten inches and where the wind is not unusually strong. A farm of from 160 to 200 acres is suggested as the proper size to begin on. A clay loam soil is the easiest to cultivate and is very productive. The land should be tested to a depth of at least six feet so that its structure may be fully known. After being cleared and broken, the land should be allowed to lie fallow for a year. Deep plowing and fall plowing are generally the most practicable. After plowing and always before sowing, the land should be disked and harrowed and the harrowing should be continued as long as the crops will stand it. Weeds must be absolutely destroyed, and, under a rainfall of less than 15 inches, the land should lie fallow every other summer; in regions of higher rainfall, every third or fourth summer. Much care must be taken to keep the soil fertile by the use of green manure. For seed, that produced upon dry-farms is best, but any drought-resisting varieties may be used. Wheat is considered the best dry-farm crop and Turkey wheat is the best variety; corn ranks second. Only the best

machinery should be used and the farmer should continually study his land and the methods of cultivating it to best advantage. Widtsoe, president of the Agricultural College of Utah, says, "When the methods of dry-farming are understood and practiced, the practice is always successful; but it requires more intelligence, more implicit obedience to nature's laws, and greater vigilance than farming in countries of greater rainfall."

The interest in the subject in all parts of the world is attested by the success of the seven annual international dry-farming congresses which have already been held, and the progress already made by the new system. For further discussion of the subject consult: J. A. Widtsoe, *Dry-Farming*; *Dry-Farming in Colorado*, Bulletin 145, Colorado Experiment Station; *Dry-Farm Practice in Montana*, Circular No. 3, Montana Experiment Station; and other bulletins issued by the United States Department of Agriculture, Washington, D. C.

Dry Kiln, Kil. See LUMBER.

Dry Rot, a peculiar fungus disease which attacks felled trees and even frame structures, but is not injurious to living trees. It is particularly objectionable because trees, which are sound when felled, are liable to become affected before they leave the forest. Spores of the dry rot enter cracks, which are formed as the wood dries, and, when rain or any wetting causes an access of moisture and the cracks close, the germ of the disease is firmly embedded within. It grows by feeding upon the woody tissue and puts forth filmy, white, threadlike fibers that spread rapidly throughout the log or beam. The threads, collectively called mycelium, will live unnoticed for a long time in logs or boards which are kept dry, but as soon as they are moistened rapid growth begins.

Dry rot first appears upon the surface as a thin, white film which soon thickens at the center, becomes porous and then turns rusty-red; as the white mycelium spreads, the central, rusty portion also enlarges and so gradually eats away the entire woody structure. In the mid-

stages of this disease, the wood has a "red stripe," which makes known the presence of the growing mycelium, and such wood, if used where it is likely to collect dampness, should be coated with creosote to prevent the spread of the disease. Any damp, deadening material or packing placed between walls or any alkali-containing substance, is apt to assist in advancing dry rot. Wood known to be affected should never be used in structural work unless it can be and is to be soon removed. Dry rot is common in old musty houses, damp sheds and upon unpainted, ill-kept cupboards.

A disease which causes the rotting of potatoes and other vegetables is often spoken of as dry rot. It is also a fungus disease but its life history is not fully known; hence its prevention and treatment are matters for further scientific investigation. See FUNGICIDE.

Dry Tortugas, a group of ten small islands, or keys, belonging to Monroe Co., Fla., and lying directly west of Key West and 120 m. southwest of the mainland of Florida. They are low, of coral formation, and have little vegetation except mangrove shrubs. A small fort located upon one of the islands was a Federal penal station of the Civil War and is now used as a quarantine station.

Dub'lin, the capital of Ireland, situated in Dublin Co. at the mouth of the Liffey River. The two equal portions on each side of the river are joined by bridges, the most magnificent of which is O'Connell Bridge. Among the public buildings are St. Patrick's Cathedral, Christ Church, the St. Augustine's, St. Kilvin's, St. Mary's and St. Savior's churches, a Jewish synagogue, monasteries, convents, Dublin Castle, the Bank of Ireland, the custom-house, the Four Courts, the Royal Dublin Society, the Museum of Natural History, the National Gallery of Ireland, Trinity College and University, the Roman Catholic University, a medical school, hospitals, asylums and orphanages. Glasnevin, a suburb on the north, is very beautiful, as is Phoenix Park, extending over an area of 1750 acres. This park shelters herds of

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deer, has extensive brushwood and timber and is a favorite spot for recreation. Beyond it is the Lodge where the viceroy of Ireland retires, after having held court in Dublin Castle throughout the winter.

Dublin manufactures poplin, porter and whiskey, and has foundries, glassworks, cotton and linen factories. Iron and steel manufactures, whiskey and wool are the chief exports. Railways and canals connect it with the interior of the country, and the shipping is extensive. The harbor is kept open to steamers by means of continual dredging. In 448 St. Patrick baptized the King of Baile-atha-cliaith, and Christianity was introduced into Ireland. The Danes captured the city in the ninth century, and retained it in their possession until the Norman Conquest. Population in 1914, 406,000.

Dublin, Ga., a city and the county seat of Laurens Co., 52 m. s.e. of Macon, on the Oconee River and on the Macon, Dublin & Savannah, the Central of Georgia, the Wrightsville & Tennille and other railroads. It contains Veneer, cotton and cottonseed-oil mills and manufacturing of staves, wagons, machinery and naval stores. Dublin was first settled in 1807 and incorporated in 1850; it is governed under a charter of 1905. Population in 1910, 5,795. In 1920, 7,707.

Dub'lin, University of, an institution of higher education established at Dublin, and for years the only one of its kind in Ireland. It was first founded in connection with St. Patrick's Cathedral in 1320, but lacked funds to continue its existence. In 1591 Elizabeth granted a charter establishing Trinity College at Dublin with the understanding that other colleges were to grow up about this and that it would become a university. Though long hindered in growth by lack of funds, it has expanded until it is one of the great universities of the British Isles. There is an astronomical observatory at Dunsink five miles away, and museums of natural philosophy, geology and mineralogy, zoology, engineering, botany, pathology and *materia medica*, a large botan-

DUBUQUE

ical laboratory with gardens, and a library of 485,000 volumes. The grounds are extensive and the buildings large and graceful. Burke, Sheridan, Swift, Berkeley and Goldsmith are among the famous men that have attended this university.

Dubois', Pa., a city of Clearfield Co., 129 m. n.e. of Pittsburgh and 27 m. n. of Clearfield, the county seat, on the Buffalo, Rochester & Pittsburgh, the Buffalo & Susquehanna and the Pennsylvania railroads. It is principally engaged in the coal mining industry, but there are ironworks, a foundry and machine shops, lumber and flour mills, tanneries, etc. Dubois was settled in 1873 and incorporated as a borough in 1881. Population in 1910, 12,623. In 1920, 13,681.

Du Bois', William Edward Burghardt (1868-), an American educator of negro descent, born at Great Barrington, Mass. He was educated at Fisk University, Nashville, Tenn., where he graduated in 1888. After taking his A. M. at Harvard in 1891, he studied in Berlin. Subsequently he served as assistant in sociology at the University of Pennsylvania, and since 1896 has been professor of economics and history in Atlanta University. He is general editor of the university publications, and the author of *The Suppression of the African Slave Trade to the United States, 1638-1870*, *The Philadelphia Negro* and *The Souls of Black Folk*.

Dubuque, Doo buke', Iowa, a city, port of delivery and county seat of Dubuque Co., 175 m. n.w. of Chicago, on the Mississippi River, opposite the boundary line between the states of Illinois and Wisconsin, and on the Illinois Central, the Chicago Great Western, the Chicago, Burlington & Quincy and the Chicago, Milwaukee & St. Paul railroads. A Mississippi River line of steamers plies between St. Louis, St. Paul and intermediate points, including Dubuque, which has important industrial and manufacturing interests. The river is here almost a mile wide and is spanned by three large bridges, one rail and two wagon bridges across to Illinois and Wis-

consin. There is an excellent street-car system and the city is noted as an example of the "less than five cents' fare." The city is the center of the lead region of Iowa, southwestern Wisconsin and northwestern Illinois.

PARKS AND BOULEVARDS. The business portion of the city lies on the lowlands bordering the river, and in the upper portion the streets rise picturesquely one above another and command extensive views of the Mississippi Valley. For this reason the city is known as the "Heidelberg of America." There are many handsome residences. The streets are broad, well paved and profusely shaded, and there are a number of parks, chief of which are Eagle Point, Union and Nutwood. There are a number of inclined cable roads leading from the river level to the bluffs.

PUBLIC BUILDINGS. Among the noteworthy buildings are the county courthouse, Masonic, Elks and Odd Fellows' temples, Julian Hotel, Federal Building, Y. M. C. A. and Y. W. C. A. buildings, Security Building, banks, theaters, Dubuque Clubhouse, fine railroad stations and substantial business blocks. There are about 31 churches and several missions. The city is the seat of a Catholic see. Near Dubuque is a Trappist monastery, one of the two monasteries of the order in America.

INSTITUTIONS. Among the leading educational institutions are the Columbia College, University of Dubuque, Wartburg Seminary, Carnegie-Stout Library, Academy of the Visitation, Herrmann Museum and a business college, excellent public and parochial schools with splendid buildings and equipment are maintained, with modern High School and Junior High Schools. Mount St. Joseph's College and Academy are situated on an eminence about a mile from the city. The benevolent and charitable institutions include the Finley and Mercy hospitals, St. Joseph's Sanitarium, Mt. Carmel Infirmary, House of the Good Shepherd, Home for the Friendless, St. Mary's Orphans' Home and Home for the Aged.

INDUSTRIES. Dubuque is the oldest jobbing center north of St. Louis and is the most important lumber market in the state. The extensive manufacturing industries are represented by boat and boiler works, boot and shoe factories, cabinet works, tin and galvanized-iron works, gasoline-engine works, brickyards, paper-box factories, rolling mills, sheet-metal works and manufacturing of clothing, caskets, agricultural implements, furniture, hardware, brass goods, sash, blinds and doors, excelsior and wood pulp, mattresses, chemicals, wagons and carriages, cigars, overalls, shirts, wire goods, structural steel, confectionery and cement specialties. Pork packing, tanning and wood working are important industries. Extensive car-repair shops are also located here.

HISTORY. The city was given its name in honor of Julian Dubuque, a French trader who voyaged down the Mississippi in 1788. He explored mines and traded with the Sac and Fox Indians, leasing from the Spanish governor the territory which now includes the city of Dubuque. Dubuque died in 1810 and was buried by the Indians on the brow of a bluff over which stands an imposing monument erected in 1888 by the Early Settlers' Association. Dubuque was incorporated in 1841. Population in 1920, U. S. census, 39,141.

Du Chaillu, *Du Sha' yu'*, Paul Belloni (1835-1903), African explorer, of French parentage. He accompanied his father, who was an African trader, to the French settlement on the Gabun, on the west coast of Africa, and was educated by the Jesuits, in the meantime learning the language of the different native tribes. In 1852-55 he lived in the United States, where he became a naturalized citizen. He returned to Africa, and undertook an extensive exploring expedition into the region near the equator, making important discoveries concerning the zoology, ethnology and geology of a hitherto unknown part of the country. The accuracy of his reports was questioned by scientists but was substantiated by later investigations. A sec-

and expedition, in 1863-65, confirmed the legendary accounts of the existence of a race of pygmies in the African forests. He returned to the United States as a lecturer and later traveled in northern Europe. Among his writings are *Explorations and Adventures in Equatorial Africa*, *A Journey to Ashango Land*, *Country of the Dwarfs* and *The Land of the Midnight Sun*.

Duck, a name applied to a large group of waterfowl belonging to the same family as the geese and swans. They are distinguished by very short legs, heavy bodies and flat bills. Two divisions of duck are recognized: the river ducks and the sea ducks, the latter being distinguished by a lobe on the hind toe, which is absent in the river ducks. About 160 species are known, living in nearly all parts of the world, the larger number occurring in the warmer zones. In the colder zones the ducks are migratory, passing northward and southward in immense flocks in the spring and fall. The males are usually larger and more brightly colored. The nest is generally built on the ground, but some species nest in holes in trees and also build in the branches of trees. The sets of eggs vary from 6 to 16. Incubation requires upwards of four weeks, and the young, when hatched, are covered with down and are able to take care of themselves at once.

Many ducks migrate long distances (the mallard flies from Alaska to Panama), and attain a speed as high as 90 m. an hour. Examples of ducks are the mallard, the eider duck, the gadwall and the shoveler, each of which is described under its title. The common duck is a descendant from the wild mallard. In domestication these ducks become larger and lose the pairing habit of the wild state, becoming polygamous and caring less for the duties of incubation.

Duck'bill", or *Plat'ypus*, a family of peculiar Mammals inhabiting the rivers of Australia, Tasmania and New Guinea. They are curious little animals, from 18 to 20 inches long, that look as though their parts were not well put together

or as though made from left-overs of other species. Their plump bodies are covered with sleek, gray, water-shedding fur, and their short, flat tails lie flat upon the ground; the feet are armed with claws but these are quite surrounded by a mittenlike webbing much too large for the foot; upon the hind feet are short, movable spurs, which can be made to discharge venom at will. The head is round and there are no external ears, though the hearing of the animal is keen. The eyes are protected by a tender fold of skin, which, however, does not interfere with the vision. Instead of a muzzle there is a long, flat, duck-like bill which, in the young, contains a few teeth. The tongue is spiny, the cheek pouches are well developed, the nostrils are at the end of the upper jaw.

The duckbill is aquatic in its habits and builds its home upon the bank of a stream, with one opening above and one below the surface of the water. It lays two white eggs which hatch in a short time and set free two blind and helpless babies. The food of the duckbill consists of insects, small water animals and seaweeds.



DUCKBILL

Duck'weed", an interesting group of plants classed in the Duckweed Family. They consist of small green bodies found floating on the surface of stagnant water, often rootless but sometimes having a cluster of threadlike roots. Their whole structure seems to consist of a disklike body which is capable of absorbing and digesting food. In this country it has never been found in blossom, but in Europe tiny flowers have been found

which are without calyx or petals but are covered instead by a leaflike sheath called the spathe. There are two species of duckweed known in the United States, differing only slightly in character and habits.

Dudevant, *Dud'* vahn', Amandine. See SAND, GEORGE.

Dud'ley, Thomas (1576-1653), second colonial governor of Massachusetts Bay Colony, born in Northampton, Eng. In 1630 he accompanied Winthrop to America as deputy-governor, and from this time until his death, barring Winthrop, he was the most influential man in the colony. He was deputy during 13 years, and governor in 1634, 1640, 1645, and 1650. He was instrumental in founding Newtown (Cambridge) and in establishing Harvard College, 1636. Twice he was president of the New England Confederation, and he led in radical resistance to England.

Due Bill, a written acknowledgment of debt. In its simplest form this might be, "I. O. U. \$6. John Doe." A somewhat longer form would be, "Due Richard Roe \$70; value received. John Doe." Under the common law a due bill implies indebtedness. It, however, is not a promise to pay, and consequently is not a promissory note or, like it, negotiable paper. Yet a due bill may be assigned by the payee as a claim against the debtor.

Du'el (from Latin *duo*, meaning two), a combat with deadly weapons between two persons. Dueling arose in ancient times probably out of the "wager of battle" by which titles to property and other disputes were settled by champions. It was fostered by chivalry and the universal habit of carrying swords. Dueling was so generally practiced in France that in the reign of Henry IV, 4000 persons were slain by this practice. Duels are fought before witnesses who are called seconds, who make all the arrangements as to time, place, weapons, etc., and see that everything is carried out according to agreement. Dueling is still practiced to some extent in France, but usually without fatal results. Duels are

fought also in Germany, particularly among the students and in the army. In England it was prohibited by law in 1844. It is a crime in America, and a challenge is a felony. See CHAMPION.

Duf'ferin and Ava, Frederick Temple Hamilton Blackwood, FIRST MARQUIS OF (1826-1902), a British diplomat, born in Italy. In 1841 he succeeded to the title of Baron Dufferin and nine years later he was created an English baron, and became lord-in-waiting to Queen Victoria. He made his reputation as a writer by the publication of his humorous account of a yachting tour to Iceland in 1853. After serving in many important government positions, in 1872 he was appointed governor-general of Canada, where his brilliant administration was marked by unusual diplomatic ability in handling the problems of the newly united provinces. He became ambassador to St. Petersburg in 1879, and to Constantinople in 1881, and in 1884 he was appointed viceroy of India. While in this position he secured the annexation of Burma and the establishment of the boundary line of Afghanistan. He was ambassador to Rome from 1888 to 1891, and to Paris from 1891 to 1896. His published works are *Letters from High Latitudes*, *Irish Emigration* and *the Tenure of Land in Ireland* and *Speeches and Addresses*.

Du'gong, a member of the Manatee Family, found only in the Old World and there inhabiting the Red Sea and coasts of the Pacific and Indian islands. Like all manatees the dugongs are aquatic, but they come upon the shore in great herds to browse and are often found at some distance from the sea. They differ from true manatees in having few teeth, a forked tail and an overhanging upper jaw, with long incisor teeth. The dugong is highly prized for its valuable oil. The affection of the mother for her young is a striking characteristic of this species. See MANATEE.

Dulcimer, *Dul' si mer*, an ancient musical instrument consisting of metal wires stretched over a sounding board in the shape of a trapezoid. The wires were

held in place and tightened by means of pegs at one end. Its compass was two or three octaves. It was played by means of two small cork hammers held in the hands. The dulcimer was the forerunner of the piano and was once thought to be a variety of the ancient Jewish psaltery or harp. Those instruments are now thought to have been more like modern bagpipes.

Duluth, *Doo looth'*, Minn., a city and the county seat of St. Louis Co., 150 m. n.e. of St. Paul and Minneapolis and 478 m. n.w. of Chicago, at the west end of Lake Superior, at the mouth of the St. Louis River and on the Duluth, Missabe & Northern, the Duluth, South Shore & Atlantic, the St. Paul, Minneapolis & Sault Ste. Marie, the Great Northern, the Chicago, Milwaukee & St. Paul, the Duluth & Iron Range, the St. Paul, Minneapolis & Omaha, the Canadian Northern and other railroads. A narrow strip of land known as Minnesota Point separates the bay from the lake, and with St. Louis Bay forms one of the finest natural harbors in the country. Duluth covers a large area and extends along Lake Superior, the harbor and the St. Louis River to Fond du Lac, a distance of 26 m. The city is an extensive commercial port and is attractively situated along the side of a high bluff rising 600 feet above the lake level. The Duluth-Superior Traction Company controls the street-car system of both Duluth and Superior (Wis.), passing over the interstate bridge. There is also a ship canal across Minnesota Point spanned by a famous aerial bridge 400 ft. long and 186 ft. above water, operated by electric power. Along the water front are mills, furnaces, docks and many grain elevators. The cities of Duluth and Superior constitute the largest coal-distributing center in the Northwest and have some of the largest coal docks in the world.

PARKS AND BOULEVARDS. The main features of the extensive park system are the Boulevard Drive and Lincoln, Lester, Fairmount, Central, Cascade, Chester and Portland parks, which are noted for their

natural beauty. The boulevard is a ten-mile drive along the bluffs at a height of 400 ft. above Lake Superior, commanding magnificent views of the surrounding region. The streets are broad and well paved and beautifully shaded, and there are many elegant residences built on commanding heights of the city.

PUBLIC BUILDINGS. Among the most noteworthy structures are the county courthouse, Federal Building, Board of Trade, Y. M. C. A., Y. W. C. A. and Elks' buildings, Masonic Temple, Commercial Club, Orpheum and Lyceum theaters, hotels, state and national banks, the Alworth, Sellwood, Palladio, Fidelity and Wolvin buildings, and substantial business blocks. There are about 90 churches. The city is the seat of an Episcopal bishopric and a Catholic see. The United States Government maintains a life-saving station and a fisheries building on Lester Park.

INSTITUTIONS. The educational institutions include a state normal school opened in 1903, a Central High School, a technical school, business colleges and public and parochial schools, Sacred Heart Institute and a Carnegie library. The benevolent and charitable institutions include a number of hospitals and a training school for nurses.

INDUSTRIES. The excellent position of Duluth for lake transportation and the fine water power of the St. Louis River make the city an important commercial port and jobbing center. Several thousand vessels enter and clear the Duluth-Superior port annually. There is an immense output of iron ore from the rich Vermillion, Cayuna and Mesaba iron ranges, and there are also extensive blast and steel furnaces, United States Steel Plant, sawmills and flourmills, foundries and machine shops, stockyards, slaughterhouses, cold-storage plants, cooperages, woodenware works, sash, blind and door factories, lath and shingle works, coke ovens and shipyards, woolen mills, calcium-carbide works and match and furniture factories.

HISTORY. The first white men to visit what is now Duluth were Radisson and

Groseilliers. In 1660 they shipped from this point canoes laden with furs. Daniel Gresolon, Sieur du Lhut, after whom the place was named, traded with the Indians at Fond du Lac in 1679. Duluth was incorporated as a town by act of the Territorial Legislature in 1857. A city charter was adopted in 1890, a home rule charter in 1900, and commission form of government, Dec. 3, 1912. Population in 1920, 99,917.

Duma, *Doo' mah*, or **Douma**, the name given to the lower branch of the legislative department of Russia, established by an imperial manifesto on Aug. 19, 1905, and frequently referred to as the National Assembly. The members of the Duma are elected by the Zemstvos, the 34 provincial representative assemblies established under Alexander II, which have joint legislative power with the Council of the Empire. Bills passed by both the Council and Assembly are subject to veto by the emperor. A bill thus vetoed cannot be reintroduced at the same session. Both the Duma and the Council have the right to annul the election of any of their members. Among the restrictions of the Duma are that it cannot participate in legislation regarding entailed estates or titles of nobility. It cannot discuss the reports of the minister of finance or consider charges of malfeasance against officers of the government or members of the Council.

The revolution of 1917 was initiated by a brief conflict between the duma and Nicholas II. The duma indeed overthrew despotic government in Russia, but it liberated forces it could not control and was itself abolished by the All-Russian congress of workmen and soldiers in June of the same year, and the Bolshevik rule initiated. (SEE RUSSIA.)

Dumas, *Du' mah'*, **Alexandre**, the Elder (1802-1870), a French novelist and dramatist, born in Villers-Cotterets. His grandparents were the Marquis de la Pailleterie and the negress, Marie Dumas. Going to Paris at the age of 20, he was employed as secretary to the Duke of Orleans and engaged in literary work during his leisure hours. His first suc-

cess, *Henry III*, brought him 30,000 francs and was received with delight by the Romanticists. Several other dramas followed and his reputation was established. Aspiring to be the Walter Scott of his country, he took up novel writing, planning to deal with the whole course of French history. In all he wrote over 300 volumes (to Napoleon he said he had written 1200), trusting to hack writers to do a part of the actual work, once his fame was secured. Untiring industry, however, rather than collaboration, accounts for the great number of his productions. His large fortune was quickly reduced, and, poverty-stricken during the last years of his life, he went to live with his neglected son. The popularity of his *The Three Musketeers* and *The Count of Monte Cristo* spread throughout France, England and America. Other well-known works are *Twenty Years After*, the *Vicomte de Bragelonne*, *Margaret of Anjou* and *The Black Tulip*.

Dumas, **Alexandre**, the Younger (1824-1895), a French dramatist, born in Paris. He became interested in writing, and his first poems and sketches were produced at an early age. A book of poetry, published in 1840, was mediocre; but the novel, *La Dame aux Camélias*, appearing in 1848, immediately become popular. Its dramatization six years later marked the introduction of realism in the treatment of moral and social problems on the stage. He took himself seriously as a moralist and in most of his writings satirized successfully the vices and follies of French society. He was elected into the French Academy in 1874. Among his other dramas are *La Question d'Argent*, *Le Fils Naturel*, *Monsieur Alphonse* and *La Femme de Claude*.

Dum'dum', a town in Bengal, India, and also the name of a bullet first made there. The town is five miles from Calcutta, has a population of 21,000, and is noted chiefly for its arsenal and the Dumdum bullet. This bullet is made with a soft point instead of the usual hard point, so that instead of boring through the bone it flattens upon con-

tact and shatters it. The Hague Peace Congress agreed that these bullets should not be used in war.

Dumouriez, *Du" moo" rya'*, **Charles François** (1739-1823), a French general who first saw service in the Seven Years' War and later went to Corsica with an expedition sent to conquer that island. Though not in the favor of Louis XV, he was made governor of Cherbourg by Louis XVI. During the French Revolution he was first a Jacobin and then a Girondist and was for a short time the minister of foreign affairs. Later he resigned to lead the army into Flanders, where he defeated the Austrians and captured Belgium. Because he had hopes of restoring the constitutional monarchy of France he was deprived of his command and a price was set upon his head. He deserted to the Austrians, but spent the last years of his life in England writing his *Mémoires* and numerous political pamphlets.

Dun'bar, **Paul Laurence** (1872-1906), an American poet of African descent, born at Dayton, Ohio, where he received a public school education. He tried journalism in New York and later was on the staff of the Congressional Library. He has appeared in public as a reader of his poems, which portray the actual humor and pathos of Southern negro life. William Dean Howells and others have commended his more mature work in dialect. His writings include the poems collected under the titles of *Oak and Ivy*, *Majors and Minors*, *Lyrics of Lowly Life*, *Poems of Cabin and Field* and *Joggin' Erlong*; the volume of short stories, *Folks from Dixie*; and the novel, *The Uncalled*.

Dundee', a city of Scotland in Forfarshire, on the north shore of the Firth of Tay, about 37 m. n.e. of Edinburgh. Among the buildings of architectural distinction are the town hall of Roman Ionic style, with a spire 140 ft. in height, the Albert Institute, University College, the royal exchange and the St. Paul's Episcopal Church. The textile manufactures, especially those of coarse linen fabrics, canvas, sheetings, ducks, etc., are among

the most significant in Great Britain, and the confectionery and marmalade industries are likewise famous. Shipbuilding and machine making are carried on, and the city is the center of the British whale-and seal-fishing trade. In 1160 Dundee was made a royal burgh by William the Lion; because of its strong fortifications it assumed military importance during the Reformation and the wars between the Scotch and the English.

Dune, a hill of drifting sand whose position is always changing. The name was first applied to the sand mounds of northern France and on the coast of Netherlands. In England the term *downs* is applied to a similar formation. Dunes are found in all windy regions containing large tracts of sand or other arid soil. Along the Atlantic coast of North America drifting sand hills are of frequent occurrence, and often 30 or 40 ft. in height. The dunes on the coasts of the Bermudas and Bahamas sometimes reach a height of 200 ft. Dunes also occur on the shores of the Caspian and Aral seas and in northern Indiana a short distance from Lake Michigan. See WIND; GEOLOGY.

Dunedin, *Dun e' din*, the capital of the provincial District of Otago, in New Zealand, situated at the head of Otago harbor, on the east side of South Island. It has many handsome buildings, is the seat of Otago University, established in 1871, the see of an Anglican and a Roman Catholic bishop and the seat of a United States resident consular agent. Regular steamship communications are maintained with Melbourne, and important agricultural and manufactured products are exported. It was founded by the Free Kirk of Scotland in 1848; the population increased rapidly after the discovery of gold in 1861. Estimated population, over 56,000.

Dunkers, *Dun' kers*. See GERMAN BAPTIST BRETHERN.

Dun'kirk', **N. Y.**, a city and port of entry of Chautauqua Co., 37 m. s.w. of Buffalo, on Lake Erie and on the New York Central, the Erie, the Pennsylvania and Nickel Plate railroads. It has

a commodious harbor accommodating fishing boats, which catch about 3,000,000 pounds per year. Among the features of interest is Point Gratiot Park, with its camping grounds for tourists, its public bath house and State Fish Hatchery. The industrial plants include locomotive works, steel plants, silk mills, axe factory, glass plant, etc. Dunkirk is in close connection with the coal, iron and oil fields of Pennsylvania. Population in 1920, 19,336.

Dun'lin, or Sea Snipe, a bird of the Snipe Family, about the size of the robin, with gray, rusty-brown and black upper parts and black and white under parts. This snipe is a common shore bird in Europe, where it is usually seen actively running along the sandy beach, just above the water line, searching for mollusks and other animals.

RED-BACKED SANDPIPER. This species inhabits North America and eastern Asia. The three or four eggs are laid in a nest of dry grass and are spotted with dark brown and chocolate. This bird breeds in the Far North and winters from California and the Gulf States southward.

Dun'more, John Murray, EARL OF (1732-1809), an English colonial governor in America. He was appointed governor of New York in 1770 and governor of Virginia the following year. His unjust rule of the colonies caused intense dissatisfaction, and in 1775, after he had removed a powder magazine to an English ship, Patrick Henry led an uprising against him. He was forced to seek refuge on his fleet, and for some time kept up petty warfare against the colonists, burning Norfolk in 1776. After returning to England he served as governor of the Bahamas from 1787 to 1796.

Dunmore, Pa., a city of Lackawanna Co., adjoining Scranton, on the Delaware, Lackawanna & Western and the Erie railroads. It has fine public buildings and several charitable institutions, among them homes for the friendless and foundlings. Nay Aug Park is not far distant. The town is the center of

extensive anthracite, brick, iron and silk interests and also an important distributing point for general supplies in the mining region. Dunmore was settled in 1835 and incorporated in 1862. Population in 1920, 20,250.

Dunne, Dun, Finley Peter (1867-), an American journalist, born in Chicago. After studying in the public schools, he entered the field of journalism in 1885. He was city editor of the *Chicago Times* in 1891-92; was on the editorial staff of the *Chicago Evening Post* and the *Times-Herald* from 1892 to 1897; and was later editor of the *Chicago Journal* for three years. Immediate popularity was established with his creation of *Mr. Dooley*, a publican of Archey Road, whose conversations with *Mr. Hennessy* on political and social topics were clever, humorous and satiric attacks on the follies and foibles of men. He is the author of *Mr. Dooley in Peace and War*, *Mr. Dooley in the Hearts of His Countrymen*, *Mr. Dooley's Philosophy* and *Mr. Dooley's Opinions*.

Duns Scotus, Duns Sco' tus, John (about 1275-1308), an eminent scholastic of the Middle Ages. He won distinction in mathematics while studying at Oxford, where he was afterwards appointed professor of philosophy. In 1307 he received the doctor's degree from the University of Paris and was appointed regent of its theological school. He defended the doctrine of the Immaculate Conception, since declared a fundamental doctrine of the Catholic Church, in a long controversy with Thomas Aquinas. In philosophy he was a realist, and in theology he maintained that revelation (not reason and revelation) was the only source of knowledge. He supported absolutely the doctrine of free-will. Among his works are commentaries on Aristotle, on the Bible and on the *Sentences of Peter Lombard*.

Dun'stan, Saint (about 925-988), Archbishop of Canterbury, born in Glastonbury, England. In the abbey of his native town he received a fairly liberal education in the arts and sciences. Becoming a monk, he entered upon a rigor-

ous course of asceticism. Under King Edmund he became abbot of Glastonbury and state treasurer; was ruler in all but name under Eldred; was banished under Edwy; and was recalled by his successor, Edgar, and made his chief minister. In 960 he became Archbishop of Canterbury. In that position he instituted various reforms, including insistence on celibacy among the priests; and, continuing as chief minister of state, was the close adviser of the King in the administration of government. When Ethelred came to the throne in 979, Dunstan lost his position, and the last years of his life were spent in retirement.

Du Pont', Samuel Francis (1803-1865), an American naval officer, born at Bergen Point, N. J. Entering the navy when 12, he served in the Mexican War. In 1861 he prepared the naval force for the Civil War, and as flag officer commanded the South Atlantic Squadron, capturing Port Royal, S. C., and Jacksonville, Fla. Later he was promoted rear-admiral, but after his failure at Charleston in April, 1863, was relieved by Admiral Dahlgren. Admiral Du Pont helped organize the school at Annapolis and wrote a report on the use of floating batteries for coast defense.

Dupré, Du pra', Jules (1812-1889), a French painter, one of the chief members of the Barbizon group of artists. His facile grace in expressing movement in nature, his mellow and luscious color and his broad treatment of the dramatic aspects of nature mark him as one of the leading romantic landscape painters of the 19th century. Among his greatest works are *Morning* and *Evening*, in the Louvre, and *Crossing the Bridge*.

Duquesne, Doo kane', Pa., a city of Allegheny Co., 1 m. from McKeesport and about 12 m. s.e. of Pittsburgh, on the Monongahela River, and on a branch of the Pennsylvania Railroad. Its steel-works and blast furnaces are extensive and it has varied manufactures. Duquesne was settled in 1885 and incorporated in 1891. Population in 1910, 15,727. In 1920, 19,011.

Dur'ban, or Port Natal, Na tahl', a

city of Natal, 70 m. e. of Pietermaritzburg and 3 m. from the coast. Being the only seaport of the province, it is of some commercial importance and has an active business district. Among its most interesting sights are a well-filled botanical garden and a fine Masonic Temple. Population, 31,896.

Dur'bar, a reception tendered in India by the governor-general to the native princes. It may be a council of state to consider political matters or it may be purely ceremonial in character. The term is now chiefly used in the latter sense and the occasion is one of great magnificence; the princes appear in their native robes, rich in Oriental colors and decorations, and the reception is formal throughout. The memorable durbars of recent years are the durbar given by Lord Lytton in 1877 to proclaim Victoria Empress of India, the Delhi durbar of 1903, and the coronation durbar of George V at Delhi in December, 1911. This last was the occasion of a great demonstration and it is estimated that fully 100,000 Indian subjects and 150 native princes were in attendance. At that time announcement was made of the transfer of the seat of the government from Calcutta, the old capital, to Delhi.

Dü'rer, Albrecht (1471-1528), a German engraver, designer and painter, born at Nuremberg, the son of a goldsmith. Abandoning his father's profession at the age of 15, he apprenticed himself to the painter Michael Wohlgemuth, with whom he remained three years. Later he traveled in parts of Germany, and, returning to Nuremberg, married Agnes Frey and opened a studio as an independent artist. After this he visited Italy, studying the arts and sciences, and Holland, where he received the highest honors. His reputation extended throughout Europe; he was made court painter to Maximilian I and to Charles V; and many of the greatest personages of his day sat to him for their portraits. He is one of the most representative figures of the German Renaissance and embodies fully the spirit of his time—many-sided, intellectually alert and in-

quisitive. His friendships included Luther, who influenced him profoundly; Erasmus, whose portrait he painted; and Melancthon.

Dürer was, in many ways, an innovator; he invented a process of printing woodcuts in two colors; he was a pioneer in his own country in treating the nude, and formulated theories of human proportions; following close upon the invention of printing, he standardized the proportions of the German alphabet. By combining the methods used in etching and engraving on copper, he perfected an art in which he was to shine as the supreme master. His greatest works in copper engraving are *The Knight and Death*, *St. Jerome in His Study* and *Melancholia*. His chief woodcuts are *The Smaller Passion*, *The Greater Passion* and *The Apocalypse*. For art for art's sake Dürer had no use. With him art was a vehicle for expression, for a record of fact. He had a passion for precision and minute detail, and would sacrifice nothing for the sake of artistic effect. His composition is crowded, his coloring crude; but in microscopic finish and mastery of line, to the end of recording a fact, he had no peer. His portraits are accurate representations of the subject. Among his greatest paintings are the *Four Apostles* (Munich Gallery) and the portrait of Hieronymus Holzschuher. His writings include treatises on painting, measuring and fortifications.

Du'ress, in law, restraint or coercion against a person's will. Restraint of personal liberty is termed duress of imprisonment. Duress is confined to narrow limits, and the defendant who claims duress as an extenuation of his act must show conclusively that he was forced to perform the act by threats of violence or death. An act committed under duress is void because it is illegal.

Dur'ham, John George Lambton, EARL OF (1792-1840), an English statesman, born in London. He entered Parliament as a Whig and later became known as an advanced Liberal. In 1828 he was raised to the peerage and two

years later became lord privy seal in the cabinet of Earl Grey. He was chairman of the committee of four that drew up the great Reform Bill of 1832. After serving as ambassador to Russia, he was appointed governor-general of Canada in 1838. A revolt of the French in Lower Canada was in progress, and his measures, though statesmanlike, were not approved by Parliament; he returned to England in 1838. However, immediately before his death, his project for uniting Upper and Lower Canada was formulated into a bill and given royal assent.

Durham, N. C., a city and the county seat of Durham Co., 25 m. n.w. of Raleigh, on the Seaboard Air Line, the Southern, the Norfolk & Western, the Durham & Southern and other railroads. The city is in the midst of a tobacco-growing region and the tobacco interests are extensive. There are cigar and cigarette factories and the largest granulated tobacco factory in the world. Other industrial plants are cotton mills, a fertilizer factory, sash and blind factories, lumber mills, a drug manufactory and hosiery mills. Durham is situated amid hilly scenery and has fine shade trees. It is the seat of Trinity College (Methodist Episcopal, South), opened in 1851, and has Trinity Park preparatory school, a conservatory of music and a school of fine art, a public library and two hospitals,—Watts Hospital, for white patients, Lincoln Hospital, for negroes. Settled in 1855, Durham was incorporated in 1869; it became the county seat in 1881. The government is administered under a charter of 1899. Population in 1920, 21,719.

* Duryea, *Dur ya'*, Pa., a city of Luzerne Co., 12 m. from Scranton, on the Lackawanna River, and on the Delaware, Lackawanna & Western Railroad. It is situated in the anthracite region and has important coal industries, being essentially a mining city. Population in 1920, 7,776.

Düs'seldorf, a city of Rhenish Prussia, the capital of the District of Düsseldorf. It is situated on the right bank of the Rhine in the center of a fertile agri-

cultural district. The city is divided into the Altstadt, Karistadt, Neustadt and Friedrichstadt, and includes the suburbs Unterbilk, Oberbilk, Flingern and Derendorf. The buildings of importance include the Academy of Art and numerous fine churches. There are well laid-out squares, and the Hofgarten is one of the finest public gardens in Europe. Elector Johann Wilhelm founded a picture gallery here in 1710, and the Düsseldorf School of Painting has become famous.

Dust, minute, dry particles of earth and other substances which are so finely powdered as to be easily carried about by the wind. Aside from its disagreeableness, dust is to be avoided because it carries with it millions of microscopic bacteria which are capable of producing disease. By this means tuberculosis, pneumonia, diphtheria and other disease germs are spread. The nasal passages are provided with fine, hairlike processes whose object is to sift the air of the dust particles and prevent their entrance into the lungs; hence breathing through the mouth is a habit which permits easier access of disease and should therefore not be contracted. See VACUUM CLEANER.

Dus'tin, Hannah (about 1657-?), pioneer and American heroine of the early Indian wars of New England. She was the wife of Thomas Dustin, of Haverhill, Mass., whom she married in December, 1677. On March 16, 1697, a band of Indians made an attack on the northwestern part of the town and after burning a number of houses came to that of Thomas Dustin. He was at work as a brick manufacturer and seven of his children were with him. His wife lay ill in the house with a week-old babe in her arms. The savages seized her and the nurse at the approach of the husband, who had hastened to the rescue, but he obeyed the entreaties of his brave wife and fled as a protector to his children and all managed to escape. The captive mother saw her infant killed and her house set on fire. Together with the nurse and an English youth, the captives were taken to the Island of Penacook,

near the present site of Concord, N. H. And here Mrs. Dustin, "heartening the nurse and youth to assist her," murdered with the tomahawk her captors as they lay sleeping, scalped them and came down the Merrimac River to Haverhill, the ten scalps and tomahawk being mighty but mute witnesses to the truth of her story. Mrs. Dustin found her husband and children, and in recognition of her heroism was made the recipient of many honors by her own and adjacent colonies. The island is now called Dustin's Island. In 1874 the commonwealths of Massachusetts and New Hampshire erected a monument on whose tablets the names of Hannah Dustin, Mary Neff, the nurse, and Samuel Leonardson, the English boy, are inscribed.

Dutch East Indies, the possessions of Netherlands among the islands of the East Indies. They include Sumatra, Java, Madura, Banca, Riau Lingga Archipelago, Billiton, Celebes, the Moluccas, Timor Archipelago, Bali and Lombok, parts of Borneo and New Guinea, and many smaller islands. Their total area is 736,400 sq. m., and their population, about 38,000,000, of whom 81,000 are Europeans.

Dutchman's Breeches. See DICEN'-TRA.

Dutch Metal, an alloy of copper and zinc containing 84½ parts of the former and 15½ parts of the latter. It is golden-yellow in color, very ductile, malleable and tenacious. It can be beaten out like gold leaf until the sheets are 1/50,000 part of an inch thick, is called Dutch leaf or Dutch foil, and is used for ornamental purposes as a substitute for gold leaf. See GOLD BEATING. Duties, Import and Export. See TARIFF.

Dvina, *Dve na'*, a river of northern Russia. Formed by the confluence of the Sukhona and the Jug, it flows northeast, joins the Vitchevda and falls into the White Sea about 26 m. below Archangel. From the source of the Vitchevda it is over 1100 m. long; it is navigable for 400 m.; its basin has an area of over 140,000 sq. m. Canals connect it with the Volga and the Neva.

Dvorak, Dvor' zhahk, Antonin (1841-1904), one of the most celebrated of latter-day composers, born in Bohemia. He composed a number of operas and cantatas and pieces for piano and for orchestra. In 1892 he became head of the National Conservatory of Music in New York, and the following year published his *New World Symphony*, in which he utilized Indian and negro melodies. His work is of interest to Americans as suggesting the possibilities for an American School of Music based upon national themes.

Dwarfs, in Norse mythology, also called Gnomes. See GNOMES.

Dwight, Dwite, Timothy (1752-1817), an American clergyman and educator, born in Northampton, Mass., and educated at Yale College. During the Revolutionary War he was chaplain in the army. Later he was pastor and principal of a boy's school in Greenfield, Conn. In 1795 he was chosen president of Yale College and remained in the position until his death. He was the author of *Travels in New England and New York* and *Theology Explained and Defended*.

Dwight, Timothy (1828-1916), an American educator born at Norwich, Conn., grandson of Timothy Dwight. He was educated at Yale College and Divinity School and at the universities of Bonn and Berlin. He was professor of sacred literature and New Testament Greek at Yale from 1858 to 1886, when he was elected president of Yale University, which position he held until 1899. He was also a member of the committee for the revision of the English version of the Bible. He has been a frequent contributor to periodicals, has annotated several commentaries on books of the Bible and is the author of *Thoughts of the Inner Life* and *Memoirs of Yale Life and Men*.

Dy'aks, the wild tribes of Borneo. It is not known whether they are original inhabitants of the island, or the successors of a Negrito people whom they expelled. They are superior to the Malays, of cheerful disposition, honest, intelligent and docile. They live in com-

fortable houses and have made distinct progress in agriculture and manufacture. Head-hunting of fellow tribesmen, to gain trophies, was a universal practice, but the evil has been practically abolished.

Dye'ing, the process of fixing a new and permanent color on fabrics, usually cotton, linen, wool and silk. In order to dye any material, it should be thoroughly cleaned and all grease removed, but in dyeing cotton and linen fabrics they must be first bleached (See BLEACHING). To remove the fatty matter in silk, it is boiled in a solution of good soap, while wool must be scoured in soda lye or a weak solution of ammonia.

In dyeing various materials, the process differs with the dyestuffs used. Formerly such dyes as indigo, logwood, cochineal and others obtained from plants, woods and insects (See INDIGO; COCHINEAL; LOGWOOD), were employed, but recent discoveries in chemistry have brought out a large number of dyestuffs made from coal-tar distillations, known as aniline dyes (See ANILINE), which are cheaper and more convenient to use. Animal fibers, like wool and silk, are more easily dyed, and combine with dyestuff more readily than the vegetable fibers of cotton and linen, so that often a simple immersion in a solution of dyestuff is all that is required to fix the color on wool and silk fabrics. Many dyes do not color the fabric the desired color, and some are not rendered permanent when applied direct to the fiber. In this case, it is necessary to use some substance with which the dyestuff will chemically combine to produce the desired color. Such an agent is known as a mordant (See MORDANTS). The mordant is usually dissolved in water, into which the materials to be dyed are immersed, but sometimes it is mixed with the dyestuff and applied to the materials. Prepared dyes with directions for using them are obtainable at drug stores, and with them simple dyeing is easily done, especially on light-colored wool and silk fabrics. Now dyeing has come to be one of the great industries, and new methods of

production of the purest colors which are also "fast," or permanent, are constantly being sought. In the beginning of the industry, many plants were used, such as dyer's weed, logwood, saffron and madder; but since the discovery of aniline in 1856, artificial dyes are far more common.

Chemically, the action of dyes is not thoroughly understood, as many anilines produce in cloth a color which they themselves do not have. Some chemists claim that the action is a chemical one, taking place between the fibers and the mordant, while others believe that the action is only a chemical mixture. See CALICO, subhead *Calico Printing*; MADDER; SILK.

Dyer's Weed. See WOAD, *Wode*.

Dynam'ics, that branch of physics which deals with the laws of forces and the motions and stresses they produce in bodies. It is commonly treated under two heads, statics and kinetics.

STATICS. Statics deals with bodies in equilibrium where the various forces acting are so related that they balance or neutralize one another and no motion results. The calculation of the stresses in the parts of a bridge and the determination of the proper sizes of the steel parts in order that they may be able to support the probable load, and the designing of the steel frame of a large modern store or office building are problems in statics. For a body acted on by several forces to be in equilibrium, two conditions must be satisfied. (1) The resultant of all the forces acting in the body must be zero. For example, when a weight is supported by two ropes held at an angle with each other, the three forces, the downward pull of gravity on the weight and the pulls of the two ropes must balance so the resultant force acting on the weight is zero. If any one of these three forces is changed, the weight at once moves. (2) The resultant of all the movements of force acting on a body must be zero. The movement of a force is a measure of its ability to rotate a body and is equal to the product of the force by the length of its lever

arm. For example, in a steelyard the small weight multiplied by its relatively long distance from the support must equal the large load multiplied by its relatively short distance from the support. If any one of these four quantities is changed, the steelyard at once tips or rotates about its point of support.

KINETICS. Kinetics deals with forces and the motions they cause in bodies. To determine how much pull a locomotive must exert on a train in order to give it a specified speed in a given time is a problem in kinetics. The inertia of a body is the resistance that a body offers to being set in motion or to having its motion changed, and the effect of a force in causing or changing this motion is proportional to the product of the magnitude of the force by the time during which it acts. It is a fundamental principle of kinetics that any force produces the same effect whether acting on a body originally at rest or in motion, whether it is the only force acting or is one of several forces acting on the body.

The whole science of dynamics is based upon three general principles laid down by Newton and known as the Laws of Motion (See MOTION, LAWS OF). For a definition of force and the units in which it is measured, see FORCE; POUNDAL; DYNE.

Dy'namite, a powerful explosive compound, made by a mixture of nitroglycerin with a porous clay. Wood fiber or rotten stone is sometimes substituted for the clay. The kind having the greatest explosive force is made by dissolving guncotton in nitroglycerin and saturating wood pulp with the mixture. It is put up in sticks eight inches long and one and one-half inches in diameter. Other names given to dynamite are giant powder, rendrock and Hercules powder. The uses of dynamite are numerous. It is extensively employed in blasting rock, and it is coming rapidly into use on farms, where it is employed to remove stumps in clearing land, to break up subsoil, or hardpan, to dig ditches and to remove large boulders by breaking them into fragments. It is occasionally used

for breaking up ships that have sunk and become an obstruction to navigation. See BLASTING; GUNCOTTON; NITRO-GLYCERIN.

Dy'namo, a machine for generating electric currents for commercial and industrial purposes. Its operation depends on electromagnetic induction (See INDUCTION, ELECTROMAGNETIC). In its simplest form, the bipolar, it consists of one or more coils of insulated wire wound on an iron core and constituting the armature, which is revolved in the field of a powerful electromagnet, thus inducing currents in the wires of the armature. These currents are conducted from the wires of the moving armature to the outside circuit, through either a pair of collecting rings or a commutator, according as the dynamo is designed to furnish an alternating or a direct current. In both cases the electromotive forces (and resulting currents) induced in the individual wires of the armature vary in strength as the wires sweep across the magnetic field or move more or less parallel to it, and are changed in direction when the wires reach one side of the field and start back. The iron case of the armature offers a better path than air for the lines of magnetic force that pass from one field pole to the other, and thus greatly strengthens the magnetic field in which the wires of the armature move.

In the case of the dynamo furnishing an alternating current, commonly called an alternator, the various coils of the armature are suitably joined together and the two free ends are brought out and soldered to the two collector rings respectively. These collector rings are insulated copper rings mounted on the shaft of the armature and revolving with it. On each ring presses a stationary and slightly flexible copper strip called a brush. From the two brushes wires lead to the switchboard and thence to the outside circuit when the current is to be used. In this case the current in the outside circuit reverses or alternates in direction just as the current in the armature does, which is twice during each

revolution of the armature; hence the name alternator.

In the case of the dynamo furnishing direct current, the two ends of each armature coil are brought out and soldered to two adjacent segments of the commutator respectively. The last end of one coil and first end of the next coil are soldered to the same segment, so the commutator consists of as many copper segments as there are coils in the armature. These segments are arranged around the shaft of the armature, insulated from each other and from the shaft, and revolve with it. Two stationary brushes, usually carbon blocks, press on opposite sides of the commutator, and through these the current is conducted to wires leading to the switchboard and thence to the outside circuit, as in the case of the alternator. But the two brushes are so placed that when the generated electromotive force in an armature coil falls to zero and changes its direction, that one of the two segments to which the ends of this coil are soldered, which was just reaching a brush before reversal of electromotive force, has passed the brush, and the other segment is just leaving that brush after reversal, so that as the current in the coil reverses in direction, the connections of this coil to the outside circuit are also interchanged. Accordingly, the current delivered to the outside circuit is always in the same direction; hence the name direct or continuous current dynamo.

The electromotive force or voltage generated in either type of machine is proportional to the product of the total number of magnetic lines of force passing from one field pole to the other, the number of wires on the outside of the armature and the speed of revolution of the armature; while the strength of current the machine can furnish is limited by the size of the wire with which the armature coils are made. The electrical power generated is equal to the product of the voltage by the current in the case of a direct-current machine, and to the product of voltage, current and a power-factor in the case of an alternator, the

power-factor varying usually from 0.6 to 1.0, according to the character of the load. The dynamo is not a source of energy, but must be driven by some outside power, usually by a steam engine or turbine or by water power. In the larger sizes, about 95 per cent of the mechanical power used to drive the dynamo is transformed into electrical power.

The electromagnets producing the field may be excited in a number of ways. For a direct-current dynamo, all or a portion of the current generated may be passed through the windings of the field magnets. If the magnets are wound with a moderate number of turns of heavy wire and all the current is passed through the windings, the machine is said to be series excited; if the magnets are wound with many turns of relatively fine wire and only a small portion of the current generated is passed through the windings, the machine is said to be shunt excited. A combination of both methods is often used, and the machine is then said to be compound wound or excited. For alternators, the field magnets are usually excited by current from a small auxiliary direct-current dynamo called the exciter. In some very small machines for special purposes, the electromagnets are replaced by permanent steel magnets, and the machine is then called a magneto machine. See MAGNETO.

In large machines it is usual to employ field magnets with many poles, the dynamo being then a multipolar one. In the case of alternators, and especially the large "three-phase" alternators used in all of the great electric generating plants, it is usual to design the machine with a stationary armature built around the multipolar field magnets and have the field magnets revolve.

Among the largest dynamos in the world are the three-phase alternators in operation at Niagara Falls, one such ma-

chine generating 12,000 kilowatts at 12,000 volts. Probably the smallest is a recently constructed direct-current dynamo exhibited at the Paris Academy of Sciences; its height is but 15 millimeters, its weight 7 grams, and its output 2 amperes at 2.5 volts, its power output being only 5 watts.

Dy'namom'eter, an instrument for measuring the force excited by machines, animals or men. Generally the term is applied to apparatus used for determining the power of engines, motors or other machines. Dynamometers are of two types, absorption and transmission. In the first kind the entire power delivered by the machine is used up in overcoming the friction of brakes usually held against the pulley wheel of the machine, and the dynamometer consists of these brakes with arrangements for measuring the power spent in producing this friction. In the second kind the force exerted by the machine is measured. For example, the difference in tension or pull of the tight and loose sides of a belt is measured; then the power being delivered can be calculated if the speed of the belt is known. The simplest form is merely a spiral spring, graduated to read the force with which it is stretched, which may be attached between a motor and the load it is pulling; the reading on the scale of the spring shows at once the net force exerted by the motor.

Dyne, *Dine*, the unit of force of the metric system. It is that force which, acting for one second upon one gram of matter, will give it a velocity of one centimeter per second. The dyne is the unit of the centimeter-gram-second, or C-G-S, system and is used as the poundal is, in the English system. The pressure of the atmosphere is about 1,013,000 dynes per square centimeter, or 473 poundals per square inch, or 14.7 lb. per square inch.

E

EADS, Eeds, James Buchanan (1820-1887), an American engineer, born at Lawrenceburg, Ind. He early went to St. Louis, becoming clerk on a steamboat, and, later, such an authority on Mississippi navigation that during the Civil War a fleet of gunboats was built for the Mississippi only after Lincoln had consulted him. Eads designed and constructed the Eads Bridge, connecting St. Louis and East St. Louis, and jetties at the mouth of the Mississippi, which permitted the navigation of ocean vessels. He also promoted improvements along the Mississippi and engaged in engineering operations throughout the world. See JETTY.

Eagle, E' g'l, a bird of the Eagle and Hawk Family. Eagles are among the largest North American birds, measuring from 35 to 40 inches in length and sometimes weighing over 14 lb. Eagles are the strongest birds of prey and possess remarkable powers of flight, strong talons and a large hooked beak for tearing their prey. They are found in Europe, Asia and North and South America. Two species are common to the United States.

GOLDEN EAGLE. This is also known as the mountain eagle, because it inhabits mountainous regions. It is dark brown, with head and neck a tawny brown. The legs are feathered to the toes. The nest, or eyry, is usually in a crevice or groove or caverned in tall cliffs or on the top of a tall rock pinnacle or high tree, and is made of sticks, loosely woven together and lined with twigs, grass, leaves and feathers. It contains two or three dull white eggs covered more or less densely with reddish-brown spots. The golden eagle is frequently seen in the Rocky Mountains and is sometimes found in the mountainous regions of New Hampshire.

BALD EAGLE. The bald, or white-headed, eagle is brown, with a white

head, neck and tail. The legs are not feathered. This eagle is found along the seacoast, rivers and lakes, from which it obtains most of its food, since, whenever possible, it feeds upon fish. It may feed upon carrion when other food is lacking. Notwithstanding its strong powers of flight and boldness, the bald eagle is not a good fisher, but obtains much of its prey by robbing the osprey of newly-caught fish (See OSPREY). This eagle also eats ducks and small Mammals. The nest is similar to that of the golden eagle.

Because of its daring and strength, the eagle has for centuries been a national symbol. It was borne on the standards of the ancient Romans and Persians, and, later, adopted as the military emblem of France, Prussia and Austria. It is also the symbol appearing on the coins and some of the flags of the United States. Strong of flight, fearless in danger and with an eye that is not dimmed by the brightness of the sun, the eagle is given a place among birds similar to that of the lion among animals; as the latter is the king of beasts, so is the former the king of the feathered tribes.

Eagle, a national emblem used as the symbol of various countries. It was one of the military standards of Rome and was carried at the head of a legion. At present it is used in the standards of Russia, Prussia and the United States. The Russian eagle is double-headed; the United States adopted the bald eagle as its national emblem in 1785.

Eames, Ames, Emma (1867-), an American operatic soprano, born in Shanghai. She studied in Paris and Boston under various teachers and made her début in Paris in 1891 as Juliet in Gounod's opera *Romeo and Juliet*. In London and New York, where she subsequently appeared, her success was instantaneous. Some of her most popu-

lar rôles are Aïda, Elisabeth, Sieglinde, Santuzza, Zaire and Yasodhara.

Ear, the organ of hearing. It con-



BALD EAGLE

sists of three principal parts—the external ear, the middle ear, or tympanum, and the internal ear. The external ear

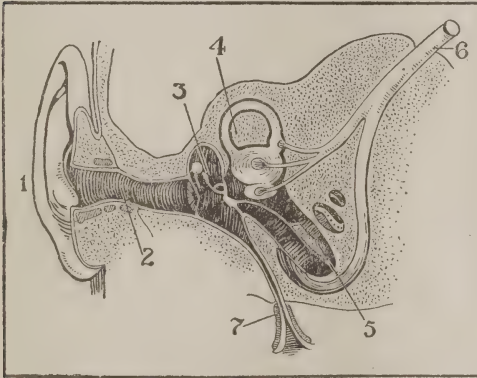
is in two parts, the outer auricle, or concha, 1, and the auditory canal, 2. The concha is the shell-shaped part of the ear consisting of cartilage, which protrudes from the head. The auditory canal is a slightly arched tube which extends inward about one and one-fourth inches. It is supplied with glands that provide an adhesive yellow substance called ear wax, which protects the inner ear from dust or insects.

The middle ear, or tympanum, 3, is an irregular cavity in the temporal bone. It is about a quarter of an inch broad and half an inch long, and is lined with membrane and filled with air. Within it is a special mechanism for transmitting the sound waves. This consists of three small bones, termed *ossicles*, called, because of their shape, the malleus, or hammer, the incus, or anvil, and the stapes, or stirrup. These bones form a chain, which transmits the vibrations from the drum membrane to the internal ear. From the cavity of the middle ear a tube about the size of a knitting needle, called the Eustachian tube, 7, passes into the throat. Swallowing movements admit air into this tube, which neutralizes the pressure on the ear drum of the air in the outer ear.

The internal ear is a complex arrangement in three chief parts—the vestibule, the semicircular canals, 4, and the cochlea, 5. These parts are made of membrane and conform to the shape of the bony cavity in which they lie. The vestibule is a triangular cavity about one-eighth of an inch in diameter, situated between the cochlea and the semicircular canals. In its base is the aperture connecting the middle with the internal ear. Against this opening fits the stapes of the middle ear. The cochlea is a small spiral tunnel, shaped like a snail shell. It is twisted two and one-half times around a central pillar called the modiolus; and projecting from this pillar and extending halfway across the cavity is a horizontal plate, which winds from base to apex like a spiral staircase. Two membranes extending from this plate to the outer walls divide the cavity into three

passages. The spiral tube thus formed between the two membranes is the canal of the cochlea. In it lies the organ of Corti, or organ of hearing. A branch of the auditory nerve, 6, enters the cochlea at the base, and its filaments connect with the cells and rods of the organ of Corti. The semicircular canals are three in number, one situated horizontally, the other two vertically. They open into the vestibule. The membranous organs of the internal ear conform to the shape of the bony cavity; and between the membranous parts and the bony labyrinth is a watery fluid called the perilymph. The membranous labyrinth is filled with a similar liquid called endolymph.

Sound waves are collected by the auricle. From the auricle they pass through



THE EAR

the external auditory canal and strike the tympanic membrane, causing it to vibrate. This sets in motion the ossicles, which in turn, through the foot plates of the stapes, or stirrup bone, starts a motion in the perilymph of the internal ear. The vibrations pass up through the canal of the cochlea and set up a disturbance in the hair cells of the organ of Corti. This consists of thousands of tiny rods or columns. Stretched across the canal and varying in size and tension, they respond to the vibrations entering the vestibule, and convey them to the nerve filaments, by which they are transmitted through the auditory nerve to the auditory centers in the brain. See BRAIN; NERVOUS SYSTEM; SOUND.

Early, Ur'ly, Jubal Anderson (1816-1894), a Confederate general, born in Franklin County, Va. He graduated at West Point in 1837, and after taking up law as a profession he became a member of the State Legislature, and was state's attorney. He served in the Seminole, Mexican and Civil wars, and attained the rank of lieutenant-general in the Confederate army. He fought in the battles of Bull Run, Fredericksburg, Chancellorsville and Gettysburg, was defeated by General Sheridan at Cedar Creek and by General Custer at Waynesboro, and was finally removed from command because of his lack of success. His position among Confederate officers, however, was by many considered not far inferior to that of Lee and "Stonewall" Jackson.

Earth, the planet of the solar system third outward from the sun, the fifth in size. Its mean distance from the sun is 92,500,000 m.; its polar diameter is 7899 m. and the equatorial diameter is 7925½ m.; its weight is about five and one-half times that of a globe of water of equal size. It moves in its orbit at the rate of 1102.8 m. per minute; its day is 23 h., 56 min., 4.09 s.; and its year is 365.26, or practically 365¼, days. When seen in an eclipse the earth has the appearance of a round, flat disk, and this is the shape which the ancients believed it to have. The actual shape, however, is that of a sphere, flattened on two opposite sides at the poles. That the earth is round appears from the fact that as one ascends higher, his range of vision is extended; that ships sighted at sea show their rigging first and finally their hulls; that since 1519 the earth has been continuously circumnavigated; and that as an ellipse it always casts a circular shadow.

There is no definite knowledge of the condition of the interior of the earth, and numerous theories have been advanced concerning it. The oldest of these is that the interior is a molten mass and that the solid part, called the crust, is a sort of shell only a few miles in thickness. More recent theories consider the interior to be in a solid state

and molten matter to exist only in small and widely separated localities, and that volcanoes are around these localities. While considering the solidity of the interior, the advocates of this theory agree that this interior is very hot.

Investigations carried on in mines and artesian wells show that the temperature increases about 1° F. for every 60 ft. of descent below the surface. At this rate the temperature 50 m. beneath the surface would be sufficiently high to melt any known substance. The great pressure of the overlying mass, however, keeps the interior of the earth in a solid condition.

The earth has two motions, one on its axis, causing day and night, and one around the sun, causing the change of the seasons (See SEASONS). Geographers have divided the earth's surface by means of imaginary lines called circles, extending about it from north to south and from east to west. Those which divide the earth into equal parts are called great circles. Those dividing it into unequal parts are called small circles. The small circles because they are parallel to each other are known as parallels. They mark the latitude. The equator is a great circle passing around the earth midway between the poles. Its plane is perpendicular to the earth's axis. The ecliptic is a great circle coinciding with the plane of the earth's orbit and forming an angle of $23\frac{1}{2}^{\circ}$ with the equator. Meridian circles are great circles passing through the poles. They mark longitude. A meridian is the half of a meridian circle extending from pole to pole. For conditions of surface and kindred topics, see PHYSICAL GEOGRAPHY; GEOLOGY.

Earth'nut', a name applied locally to any plant whose roots produce edible, nutlike tubers, but most commonly given to three widely differing specimens. The peanut, whose fruits are familiar everywhere in their roasted state, is probably the most common of the earthnuts (See PEANUT). Chufa, a member of the Sedge Family and grown in Mediterranean regions for the sake of its sweet, oily tubers, is widely known in southern Eu-

rope, and when brought to the United States is sold under the name earthnut. These tubers are about the size and shape of a bean. In Scotland a member of the Pulse, or Pea, Family, sometimes called the heath pea, produces a nutritious tuber used as a food and as a flavor for drinks. In the last two cases, the so-called nut is not a nut at all but merely a storehouse for the roots which have taken up more nourishment than the plant can dispose of at the time; in consequence, these tubers are rich in starches and oils.

Truffles, a fungus growth, which forms underground tuberlike bodies, that are edible, are in some places known as earthnuts, but this name is not applied widely. See TRUFFLE.

Earth'quake', a trembling or quaking of the solid crust of the earth due to natural causes. The strength of earthquakes varies considerably. Some are so violent that they overthrow buildings, cause fissures in the surface or elevations and depressions in the land; while others are so slight as to be quite imperceptible, and a knowledge of their existence is possible only through a delicate recording instrument called the seismograph. This instrument, which is so sensitive that it records the sagging of a city's streets during hours of traffic, shows that the earth is almost in a constant tremor, due to subterranean concussion. But although these underground disturbances are all the while going on, violent quakings are relatively rare.

Earthquakes are due to various causes. Slight subterranean tremors may be due to the falling of the roofs of caves. Others accompanying volcanic eruptions probably result from underground explosions of confined steam. Slumping of submarine land along the coasts of continents and landslides in mountainous regions are also causes. The cause of the great destructive earthquakes, however, is traced to the sudden yielding of the earth's crust in places in adjustment to the cooling and shrinking interior, producing what is known as a *fault*, or dis-

placement of great masses of rock strata (See FAULT). The center of the disturbance is usually from eight to ten miles below the surface. From this focus, or *centrum*, as it is called, the tremor travels in concentric waves like the waves produced when a pebble is dropped into a still pool,—with this difference: that whereas on the water the wave radiates only in a horizontal direction, in the case of the earth tremor, the radiations are in all directions. This being the case, the movement of the quake on the surface is always the same as the widening rings on the pool; and this could not be otherwise unless the disturbance occurred at the very center of the earth. The point on the surface perpendicular to the centrum is the *epicentrum*, and at this point the shock is first felt, being communicated by what is known as a vertical wave, which gives rise to a vertical upheaval. At distances on the surface farther removed from the center the movement is oblique. The time at which the shock is felt in surrounding localities varies with the distance from the centrum and the character of the soil. The motion is rapidly communicated in regions of hard crystalline rock, while in localities of softer material, its velocity is much less. The average rate of speed ranges from 30 to 40 m. a minute, or more than double the velocity of the swiftest projectile shot from the most improved gun. Rumbles and other noises are usually heard before, during and after a sensible earthquake sometimes at a distance of 200 m. from the center of the disturbance.

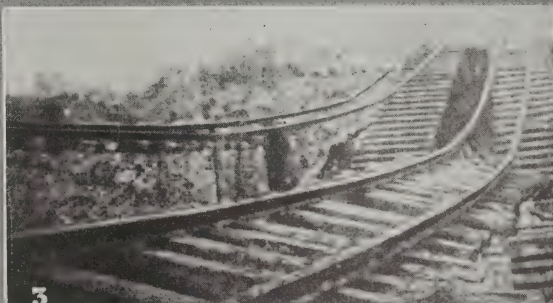
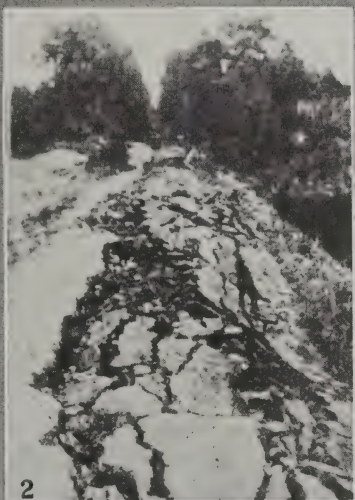
Although an earthquake may be strongly felt at so great a distance as 50 m. from the center, the actual range of the horizontal motion of the ground is usually less than one-tenth of an inch, but the motion causes bodies above ground to move much more. A noteworthy item in this connection is that earthquakes which have been among the most destructive of natural catastrophes have left in historic times almost unchanged the configuration of the land, their destructiveness being due chiefly

to the fall of buildings and to the sea waves which frequently accompany them.

History records a large number of earthquakes, but it has been only in comparatively recent times that scientific data concerning them have been collected. The most noteworthy of these cataclysms were: the Lisbon quake of 1755, in which 60,000 persons were killed by the shock and the accompanying wave; the seismic disturbance in the delta of the Indus River in 1819; the Charleston earthquake of 1886; that of Japan in 1891; that of Kangra, India, in 1905. The most disastrous earthquake of North America in historic times occurred at San Francisco in 1906. Italy has been the scene of the most devastating quakes. Its worst shock, which occurred in 1908 and which affected chiefly the Province of Calabria and the Island of Sicily, resulted in an inestimable property loss and the deaths of over 76,400 persons.

Earth'shine", the name given to the faint glow on the moon emitted from the earth. At the time of new moon the full face of the moon can often be dimly seen, as if in a dark shadow. The theory is that this darkened part of the moon is visible because it reflects a dim light received from the earth—earthshine. See MOON.

Earth'worm", **An'gleworm**" or **Fish'worm**", a family of creeping, cylindrical animals of the group known in zoological classification as the Chætopoda. There are nearly 1000 species, and they are known throughout all but the coldest regions of the earth. From their wide distribution, their structure and habits, they are familiar to the majority of people. The bodies of the earthworms are divided into numerous segments, each of which is covered by tiny bristles that project backward and are easily discovered if the worm is drawn across the finger backwards. These bristles, called setæ, aid the earthworm in securing a foothold as it wriggles from its hole to the surface of the earth. The body tapers to a blunt, rounding head anteriorly, and posteriorly to a more sharply pointed tail. Near the head is a glandular band lighter



EARTHQUAKE. (1) Collapsed factory at Fuji cotton spinning works, near Hakone, Japan, where 500 girls were killed. (2) Fissures in a road. (3) Twisted railroad tracks near Gottenba. (4) Shelter in pipes. (5) Bridge on Hayokawa River.



AFTER THE QUAKE. (1) Refugees sleeping in bamboo grove. (2) Seeking rest in Tokio street after the first and greatest shock. (3) Along the water front at Yokohama immediately after the great shock.

in color than the rest of the body; this is popularly known as the collar or girdle, and scientifically as the clitellum; it contains the eggs which are exuded into a mucus-covered sac that is later cast off over the earthworm's head and left to hatch as a cocoon. The other segments of the earthworm's body differ very little from each other in structure or use.

As is well known, earthworms make long tunnels into the ground, which they lengthen by swallowing the earth, digesting the food particles which it holds and excreting the waste matter at the opening of their tunnels. The good which they do to the soil by thus upturning and loosening it is incalculable.

The division of labor in the body of the earthworm is comparatively well arranged. A good circulatory system carries the nutritive matter through the body by means of a system of contracting and expanding vessels. The nervous system is controlled by a two-lobed brain, from which two main nerve cords extend throughout the entire body. The most highly developed sense of the earthworm is that of touch; eyes, tongue and nostrils, or organs which perform the functions of sight, taste and smell, are only slightly developed, and no hearing organs are known. The life history of the earthworm consists of but two stages, the egg and the adult worm, which escapes from the egg a few weeks after the casting of the egg sac. See WORM.

Ear'wig", a family of beetlelike insects of the order Dermaptera. Members of this family have slender bodies, many jointed antennæ and shortened wing covers, under which lie much-folded wings. At the posterior extremity of the body is a pair of strong forceps, whose use is not yet known. Earwigs are found in warm climates, and in the United States they inhabit the Pacific and the Gulf states. The name refers to an old superstition that the earwig crawled into the ear of sleeping persons and there caused serious trouble. The animal is, however, harmless to people, but works great damage to young vegetation and to blossoming plants. In some parts of

the United States a thousand-legged worm, or Myriapoda, is known as the earwig. See MYRIAPODA.

Easement, Ees'ment, an acquired right of use of the land of another by a person because of his ownership of certain lands. Easement includes a variety of rights, the most important of which are right of way, right of drainage, right of pasturage, right of light and right of water. The party enjoying the privilege granted by the easement does not thereby acquire ownership of the land, but the privilege granted is perpetual and is not affected by the sale of his land by either party. If the owner of the land on which the easement is granted attempts to deprive the other party of his legal privileges, he can be stopped by injunction or other legal processes. On the other hand, if the party enjoying the privilege exceed his rights, he can be compelled by legal measures to keep within the limits of the easement.

East China Sea, an arm of the Pacific Ocean east of China. The Island of Formosa and the Philippines separate it from the South China Sea, while the Riu Kiu Islands, a part of Japan, form the line between it and the Pacific. The Yellow Sea is a great arm of the East China Sea, scarcely to be distinguished from it. Shanghai, Hangchow and Fuchow are the chief ports, and the Yangtse-kiang is its principal tributary.

East'er, the festival of the Christian Church which celebrates the Resurrection of Jesus Christ. From early times Easter has been a day of special importance and solemnity among Christians. Roman Catholics begin their observance of the sacred festival on the preceding morning with the mass of Holy Saturday. Among both Catholics and Protestants music and flowers are inseparably connected with Easter services. Although Easter has been observed for centuries, the exact day for commemorating the Resurrection has been a matter of no little controversy, a dispute having arisen on this point between the Eastern and Western churches in the second century.

The rule now in general use is that Easter Day is always the first Sunday after the paschal full moon; that is, the full moon which happens upon or next after the 21st of March. Easter can never occur before the 22nd of March nor after the 25th of April. In 1761 and 1818 Easter fell on March 22; in 1943 it will fall on the 25th of April. Easter closes 40 days of Lent. See LENT.

Eastern Roumelia, *Roo me'li a*, or **Southern Bulgaria**, a province of Bulgaria lying south of the Balkan Mountains. Its name is a souvenir of the Roman Empire of the East. In 1878 the Congress of Berlin formed Eastern Roumelia from Turkish possessions, and, though it was still dependent upon Turkey, gave it a Christian governor. In 1885, however, the Roumelians rebelled, and the province became a part of Bulgaria. Philippopolis, one of the chief cities of Bulgaria, lies in Eastern Roumelia. The principal industries are agriculture and fishing. Its area is 13,700 sq. m.; its population, 998,500. See Bulgaria.

Eastern Star, Order of the, a secret society composed of Free Masons in good standing and their wives, mothers, sisters and daughters. The order was founded in New York in 1868. The badge consists of a five-pointed star with the word FATAL inscribed upon it, each letter being on a point of the star. The membership exceeds 530,000.

Eastern Turkestan, *Toor" ke stahn'*. See CHINESE TURKESTAN.

East'hamp'ton, Mass., a town of Hampshire Co., 4 m. s.w. of Northampton, on the New York, New Haven & Hartford and the Boston & Maine railroads. The town includes a number of villages and has manufactories of buttons, shoe web, rubber and elastic goods, yarns and worsteds. The Williston Academy, a well-known boys' preparatory school, is located here. There is a public library. Easthampton was the scene of an Indian massacre in May, 1704, in which 19 persons were killed. It was incorporated as a town in 1809. Population in 1920, 11,261.

East Hampton, N. Y., a city and summer resort of Suffolk Co., at the eastern end of Long Island, 102 m. from New York and 7 m. from Sag Harbor, on the Long Island Railroad. It is noted for its picturesqueness and is a favorite spot with artists. It was the home of John Howard Payne. At the neighboring Montauk Point, not far from Block Island, R. I., an army camp was established at the close of the Spanish-American War, owing to the healthfulness of the situation. The population in 1920 was 4,852.

East Hartford, Conn., a city of Hartford Co., opposite the city of Hartford, on the Connecticut River and on the New York, New Haven & Hartford Railroad. The chief industries include market gardening, tobacco growing and paper making. Railroad shops are located here. There is a public library. The town was incorporated in 1783. Population in 1920, 11,648.

East India Company, a company for the promotion of trade with the Far East. Although East Indian companies were established by England, Holland, Denmark, Scotland, Spain, Austria and Sweden, the one organized by England at the end of the 16th century was by far the most important. A reorganization of the company in 1702 was followed by great prosperity and increase in political power, but opportunities for corruption and misrule caused Parliament to pass an act in 1784 which gave the Crown the power of appointing a board of control having jurisdiction over the civil and military acts of the company. In 1813 the monopoly of trade with India was abolished, and in 1833 that with China. When the Indian mutiny broke out it was deemed advisable to transfer the whole administration of Indian affairs from the East India Company to the English Government, which was done in 1858.

East Indies, *In' diz*, a name given collectively to India, Indo-China and the islands of the Malay Archipelago. It includes such familiar groups as the Philippines, the Sunda Islands, Celebes

and the Carolines and many smaller, less well-known groups. The principal islands of the East Indies are described under their individual titles.

East Liverpool, Ohio, a city of Columbiana Co., in the northeastern part of the state, situated on the Ohio River and on the Pennsylvania Company Railway, 44 m. n.w. of Pittsburgh. It is connected by bridges with Chester and Newell, W. Va. The city is the most important porcelain-manufacturing center of the United States, producing both dishes and porcelain electrical supplies. Its other industries include machine shops, brickworks and a sewer-pipe factory. East Liverpool has a Carnegie library, several attractive parks and many places of natural beauty along the river. Population in 1920, 21,411.

Eas'ton, Pa., a city and county seat of Northampton Co., 65 m. n. of Philadelphia and 75 m. s.w. of New York City, on the Delaware River at the mouth of the Lehigh River and Bushkill Creek, and on the Pennsylvania, the Lehigh Valley, the Central of New Jersey, the Delaware, Lackawanna & Western and other railroads. The city has water communication with New York and Newark by the Morris & Essex Canal and with Philadelphia by means of the Delaware and Lehigh Canals. Easton is situated near the great cement belt and near the slate, iron and coal fields. Bridges for railway and general traffic connect the city with Phillipsburg, N. J., on the opposite shore of the Delaware River, and with South Easton across the Lehigh River. The city has a fine situation on rising ground and commands picturesque views of hill and river scenery. There is an excellent system of street railways connecting Easton with Bethlehem, Allentown, Nazareth, Bangor, Portland, Philadelphia and other near-by towns and cities.

PARKS AND BOULEVARDS. The city contains many miles of well-paved streets and winding driveways. The older part of the city is regularly laid out, with a public square at the intersection of the principal streets, in which

markets are held. There are many handsome residences, business blocks and churches. Paxinosa Inn is a well-known automobile club on the summit of Chestnut Hill directly north of the city. Riverside, Nevin, Bushkill and Hackett parks are the largest of the city park system.

INSTITUTIONS. Easton is the seat of Lafayette College (Presbyterian), founded in 1832. The beautiful grounds and buildings of this college are situated on a bluff north of the Delaware and overlook the city. Other educational institutions include an excellent high school, many grade schools, and a well equipped public library.

INDUSTRIES. Easton is an important industrial center and is the shipping and jobbing point for the great cement belt, some of the largest cement works in the world being within a few miles' radius of the city. There are also iron furnaces, foundries, machine shops, rolling mills, felting works, shoe factories, flour mills, silk mills, brick and tile works and manufactories of pianos, silk hosiery, organs, automobiles, cordage, sheet iron, wire, wire rope, railway supplies, chemicals, soapstone, drills, crayons, furniture, compressors and lumber products. Slate, building stone, soapstone, iron ore and lime are extensively quarried and large quantities of coal, iron, grain, lumber and slate are exported.

HISTORY. The first settlement was made about 1752. Several important treaties were made here with the Indians between 1756 and 1762, during the French and Indian War. Easton was incorporated as a borough in 1789 and granted a city charter in 1887. South Easton was annexed in 1898. Population in 1920, 33,813.

East Orange, N. J., a city of Essex Co., 12 m. w. of New York City, adjoining Newark and Orange. The city has two stations on the Orange Branch of the Erie and four on the Delaware, Lackawanna & Western railroads. East Orange is primarily a residential city and contains beautiful suburban homes

EAST PROVIDENCE

of New York City and Newark business men. With Orange, West Orange and South Orange it forms practically one community known as "the Oranges." East Orange covers an area of four square miles and has broad, well-paved, well lighted and shaded streets. Among the principal buildings are the city hall, a high school costing \$400,000 with a modern equipment and complete courses, a number of handsome churches, the clubhouse of "The Woman's Club of the Oranges" and a public library with two branches, each in its own building. The manufactures include electrical machinery, valve fittings and waterworks' supplies, hats and pharmaceutical goods. East Orange was a part of Orange until 1863, when it was incorporated as a separate township. A city charter was granted in 1899. Population in 1920, 50,710.

East Providence, R. I., a city of Providence Co., opposite the city of Providence, on the Seekonk, or Blackstone, River, and on the New York, New Haven & Hartford Railroad. It is situated along the west bank of the river and Narragansett Bay. There is a marine railway. The industrial establishments include electrical, chemical and wire works, an extensive bleachery and a handkerchief factory. East Providence and the town of Seekonk, Mass., were once a part of the town of Rehoboth. It was separated from Seekonk when the boundary line between Massachusetts and Rhode Island was determined. It was incorporated in 1862. Population in 1920, U. S. Census, 21,793.

East River, the strait connecting Long Island Sound with upper New York Bay and separating Long Island from Manhattan Island. It is connected with the Hudson by Harlem River and Spuyten Duyvil Creek. East River is slightly over ten miles in length and from one-half mile to three and one-half miles in width; at Hell Gate a ledge of rock once obstructing navigation has been blasted away, leaving the passage open to the largest steamships. Blackwells, Wards, Randalls and Rikers

EAST ST. LOUIS

islands, all containing city institutions, lie in this river. Brooklyn and Williamsburg bridges, two of the finest suspension bridges in the world, cross East River, and two other mammoth bridges are being completed.

East St. Louis, Ill., a city of St. Clair Co., third largest in the state in population and second in industry, situated on the east bank of the Mississippi River opposite the city of St. Louis, Mo., with which it is connected by the Eads and Merchants bridges. These bridges, when completed in the years 1874 and 1891, made the city the diverging point of all lines of railroad entering St. Louis from the east, until now it is the terminus of 24 steam trunk lines and three electric freight and express lines, all of which maintain large terminals and distributing yards in the city. Three double-track belt lines encircling the city connect all steam lines, which afford the best possible shipping facilities and have developed East St. Louis into one of the great gateways through which move vast volumes of traffic between all parts of the country, both by rail and river.

PARKS AND BOULEVARDS. The city contains more than 100 m. of well-paved, well-lighted and well-sewered streets; many more miles of granitoid sidewalks; a beautiful residence section, set apart from the industrial district; and miles of completed boulevards.

PUBLIC BUILDINGS. Among the public buildings is a fine city hall, Federal Building, library building, theaters, many fine churches of all denominations, and fraternal buildings, besides substantial banking and other business houses.

INSTITUTIONS. The educational institutions include the Rock High School, many public and parochial schools, the Literary Institute, a Catholic academy, several business colleges and a public library.

INDUSTRIES. East St. Louis is situated in coal fields, which assure an abundance of cheap fuel, and has an immense electric power plant that furnishes power for factory purposes. The most important manufacturing industries are repre-

sented by aluminum-ore and cooking-utensil plants, meat-packing plants, rolling mills, malleable-iron works, paint and white-lead works, baking-powder works, flour and feed mills, car-truck and spring works, chemical works, dry-paint works, zinc works, a smelting plant, interior-finish, sash, door and blind works, frog and switch works, fertilizer plants, forge works, cooperage and furniture works, an oil refinery, acid works, cotton-compress works, grain elevators, cut-stone, structural-iron and steel-bridge works, manufactories of iron-railway specialties, track-fixture works, pneumatic-tool works, bakeries, agricultural-implement works and manufactories of hardware specialties and tanks and silos.

HISTORY. East St. Louis was laid out about 1818 and incorporated as a town in 1859, since which time it has had a rapid growth. A city charter was granted in 1865. Population in 1920, U. S. Census, 66,767.

Eaton, E' ton, Seymour (1859-1916), a Canadian author, born in Ontario. In 1886 he removed to Boston, Mass., later he was director of Drexel Institute, Philadelphia, and he finally planned and directed the *Chicago Record's* home study courses. Mr. Eaton also founded the Booklovers' and the Tabard Inn libraries in the United States and Great Britain.

Eau Claire, O' 'klair', Wis., a city and county seat of Eau Claire Co., 94 m. e. of St. Paul, Minn., and 150 m. n.w. of Madison, at the head of navigation on the Chippewa River at the mouth of the Eau Claire River on the Yellowstone trail. The Soo Line, the Chicago, Milwaukee & St. Paul, the Chicago & North Western, and an electric line connects with Chippewa Falls and Altoona. The city has excellent water power and is extensively engaged in manufacturing. It has a large lumber trade and is the commerical center of north-western Wisconsin. Among the important manufactures are flour, boats, shoes, paper, wood pulp, furniture, saw-mill machinery, agricultural implements, mattresses, trunks, logging locomotives

and woodenware. Eau Claire has, among other prominent buildings, a Federal Building and county courthouse, fine school buildings, a Carnegie library, the Norwegian Lutheran and Sacred Heart, Y. M. C. A., Municipal Auditorium, hospitals, a normal school. It has a number of public parks and is an attractive summer resort. The place was first settled about 1847 and was chartered as a city in 1872. Population in 1920, U. S. Census, 20,906.

Eave Swallow. See SWALLOW FAMILY, subhead *Eave Swallow*.

Ebers, A' bers, Georg Moritz (1837-1898), a German Egyptologist and novelist, born in Berlin. He graduated at Göttingen and Berlin, was appointed associate professor at Jena, and after traveling in Egypt became associate professor of Egyptology at Leipsic in 1870. Upon revisiting Egypt he discovered a valuable medical papyrus in Thebes, dating from about 1550 B. C., a facsimile of which was published by himself in 1875. He wrote extensively on his discoveries, and later became well known for his historical romances in which he popularized Egyptian lore. Among his works are *Egypt and the Book of Moses*, *Egypt, Descriptive, Historical and Picturesque*, *An Egyptian Princess*, *Homo Sum*, *Uarda* and *The Sisters*.

Eb'ony, a name of a number of trees of the Ebony Family, distinguished by their hard, dark heartwood, which, in the most prized varieties, is a deep black. The tree grows commonly in tropical regions and has been prized since earliest times. It is mentioned in the Bible (*Ezek. xxvii*) in connection with ivory, probably both on account of their value and of their contrasting colors. Ebony was once supposed to grow in the ground "without root or leaves," and to it were ascribed many miraculous powers.

The chief source of ebony wood is the Island of Ceylon, where huge logs of the pure heartwood, two feet in diameter and 15 feet in length, are cut and hauled to the coast. For furniture and interior decorations ebony has been superseded by mahogany and rosewood, but for cab-

inetwork it is still widely employed, being exported from Egypt, India, Jamaica and Madagascar.

A species of the Pulse, or Pea, Family called ebony grows in southern United States and has a hard, dark heartwood used as a veneer.

Ebullition, *Eb"u lish' un*. See EVAPORATION.

Écarté, *A"kar"ta'*, a game for two persons in which 36 of the usual 52 playing cards are used. These rank as follows: king, queen, jack, ace, 10, 9, 8 and 7. After dealing, first three and then two or two and then three, to each player, the dealer turns up the eleventh card for *trumps*, which, if it be the king, counts one point for the dealer. The nondealer leads, if he is satisfied with his hand; otherwise, he says "Cards," and then the dealer may either lead or, from below the trump, deal to his opponent first, and then to himself, a number equal to those each discards. This must then be continued till either the nondealer or dealer is satisfied to lead. The king of trumps counts one for the holder, if in either hand. The game is five points. The winner of any trick leads in the next. To follow suit, and to take the trick if possible, are required. Three tricks count the winner one point; while five count two. If the nondealer does not propose, or his proposal is refused, and he fails to win three tricks, the dealer scores two.

Eccentric, *Ek sen' trik*, a mechanical device designed to convert a rotary motion into a reciprocal, or a sliding back and forth, motion. The name refers to the irregularity of the disk and is chiefly applied to the part of a steam engine or pump used to work the valves. The eccentric consists of a grooved disk, with its bored hole not coinciding with its center. This is fitted to a shaft, and around it is fastened by bolts an eccentric rod, which in turn provides for the back and forth motion of the valve rod to operate a slide valve. The eccentric is sometimes used in other machines when cranks or cams are not desirable. See STEAM ENGINE.

Ecclesiastes, *Ek kle" zi as' teez*, (the preacher), a book of the Old Testament, supposed to have been written by Solomon at the close of his life. Both date and authorship, however, are a matter of controversy. The writer, after showing how he has tried various worldly means of seeking happiness, comes to the conclusion that everything is vain and unsatisfying except the fear of God. The final chapter, beginning with the familiar exhortation, "Remember now thy Creator," is remarkable for its striking use of figure. See BIBLE, subhead *The Old Testament*.

Echidna, *E kid' na*, or **Spiny Anteater**, a group of Australian Mammals forming a distinct family, which is related by structure and habit to the duckbills. All of these animals have small bodies, covered with spines upon the back but with soft hair upon the under parts. The legs are short but bear strong claws. Like the duckbill, the echidna has an elongated bill full of spines which take the place of teeth. The home of the wild echidna is a burrow, generally located near a hunting ground where its favorite prey, the ant, is found in abundance and can be easily taken up by its long, slender tongue.

Echinodermata, *E ki"no der'mat a*, one of the lower groups of the animal kingdom, ranked above the Arthropoda and below the Vertebrata. The name means spiny-skinned and refers to the leathery, prickly covering of all animals of this group. The various families are widely different in form but in general have parts radiating from a central portion which has a conspicuous mouth underneath; the internal structure presents well-developed systems of digestion and circulation but a low form of nervous system, and few, if any, special sense organs. All are aquatic animals and feed upon the soft Mollusks found in the sea. In the course of reproduction the Echinodermata pass through various complicated transformations. There are four orders belonging to this group: the Sea Cucumbers, Sea Urchins, Starfish and

Crinoids. See ZOOLOGY, subhead *Classification*.

Echo, Ek' o, in Greek mythology, a mountain nymph who, having offended Juno, was deprived of the power of speech. All she could do was to repeat the sounds that she heard. Echo loved Narcissus, but her love was slighted and she pined away until nothing was left but her voice.

Echo, a sound so distinctly reflected that it seems to come from another source. Broad, flat surfaces, such as walls of buildings, ledges of rock, etc., often produce this effect. To hear the echo of one's own voice, a person must stand in a line perpendicular to the echoing surface, but to hear the echo of another's voice the two must take positions in lines making equal angles with a perpendicular to the reflecting surface. This is because sound waves are reflected in such a manner that the angle made by the original sound wave with a line perpendicular to the reflecting surface is equal to the angle made by the reflected wave and the perpendicular. An echo is distinct only when the distance of the sounding body from the reflecting surface is so great that the sound is complete before the echo returns. Distances may be judged by the length of time between a sound and the return of the echo. At ordinary temperatures an echo which returns in two seconds is reflected from a body about one-fifth of a mile distant.

Echoes are simple if returned by a single reflecting surface and complex when the reflection is from two or more surfaces. A sound produced between parallel walls 100 ft. apart has been known to return 30 or 40 times before dying away. Among the mountains of Switzerland such echoes are common, and the yodel of the mountain guide, repeated again and again by the walls of rock, dies away in faintly reechoing musical notes.

Eclipse, E klips', the obscuring of the whole or a part of a luminous body, as the sun or moon, by an opaque body passing between it and the observer. The

term, in its ordinary use, is confined to the heavenly bodies. While eclipses of the stars are frequent, they are not noticed except by astronomers who have large telescopes at their disposal. General interest, therefore, centers on eclipses of the moon and of the sun.

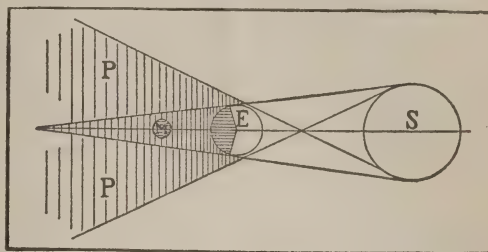


FIGURE 1

ECLIPSES OF THE MOON. If the orbit of the moon were in the same plane as the orbit of the earth, there would be an eclipse of the moon once a month, or at each full moon, because at that time the centers of the sun, moon and earth would lie in the same straight line, and as the earth passed between the sun and moon, its shadow would fall upon the entire surface of the moon facing the sun, thus forming a total eclipse. In Fig. 1, S represents the sun; E, the earth; and M, the moon, which is in the earth's shadow and totally eclipsed. Since spherical bodies cast conical shadows, that cast by the earth comes to a point a long distance beyond the moon's orbit. Bodies farther distant than this point would not be affected by the shadow. The cone of darkest shadow is called the umbra. On each side of this are regions of space, PP, from which a portion of the light is cut off. These regions are known as the penumbra. A total eclipse of the moon can occur only when the centers of the three bodies, moon, earth and sun, lie in the same straight line, and this happens when the moon reaches its full at the point in its orbit (node) where the orbit crosses that of the earth. The moon may reach its full, when it is near enough to the node to have the earth cast a shadow over a part of its disk, and then we have a partial eclipse. Eclipses of the moon

usually exceed an hour in duration, and are visible at all points on the half of the earth turned towards the moon when the eclipse occurs.

ECLIPSES OF THE SUN. At the new moon, the moon is between the earth and the sun. If this phase of the moon

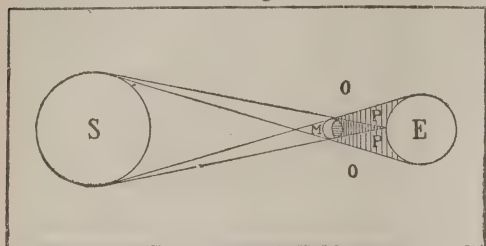


FIGURE 2

is reached when that body is at or near a node, there is an eclipse of the sun. If the moon is exactly at the node, the centers of the three bodies lie in the same straight line, and the eclipse of the sun may be total. In Fig. 2, S represents the sun; E, the earth; and M, the moon. An observer at the point of the cone of shadow would see a total eclipse of the sun, but an observer in the regions of the penumbra, PP, would see a partial eclipse. The total eclipse occurs when the moon reaches the node at the time when that point in its orbit is nearest the earth. If the node is reached when it is at a point in the orbit farthest from the earth, the cone of shadow comes to a point before reaching the earth, and an annular eclipse is formed in which a circular shadow covers the greater part of the sun's disk, but is bordered by a ring of light. When the new moon occurs at a point near the node, there is a partial eclipse of the sun.

Owing to the small size of the moon, the cone of the shadow approaches its point as it strikes the earth, and under the most favorable conditions the eclipse is total only over a small area, and in this area it can last but a few minutes. Total eclipses of the sun are among the most interesting and awe-inspiring phenomena of nature. They are likewise of great value to astronomers, since they afford an opportunity to study the sun that cannot be obtained at any other

time; consequently universities and other scientific bodies often expend large sums in fitting out expeditions for making these observations.

The last total eclipse of the sun visible in the United States occurred in 1900, the next will occur in 1918. By consulting an almanac the eclipses of both sun and moon for each year can be ascertained. See ASTRONOMY; ECLIPTIC; EARTH; MOON; SUN.

Ecliptic, *E klip' tik*, the apparent path of the sun around the earth, really the earth's orbit. The ecliptic is the central circle of the zodiac, and is in a plane inclined at an angle of $23\frac{1}{2}^{\circ}$ to the equator. The ecliptic is so-called because eclipses of the sun and moon can occur only when the moon is at or near the plane of this circle. See ZODIAC; ECLIPSE; CELESTIAL SPHERE.

Ecology, *E kol' o jy*, a department of botany which treats of the relation of plants to their environment. It deals with the effects of soil, climate, animals and other plants upon the development of plants, and discusses the distribution of seeds, propagation of plants by cross-fertilization and the grouping of plants according to these conditions.

Ecuador, *Ek' wa dor'*, a triangular country of South America, lying like a wedge between Colombia upon the n. and Peru upon the s. As its name implies, it lies in the region of the equator, but its elevation renders it far from being a tropical country, in the general acceptance of the term. The boundaries of Ecuador are still in dispute, and the maps made in that country show Brazil as the eastern boundary; however, since this disputed territory is occupied by Peruvians under Peruvian government, it is elsewhere credited to Peru. Including the Galapagos Islands the area of Ecuador is generally given as about 118,000 sq. m., or a little less than that of New Mexico.

PHYSICAL CHARACTERISTICS, CLIMATE, ETC. Ecuador lies in the path of the Andes and, except at the very coast or in the extreme east, is a region of lofty mountains containing some of the high-

est peaks of the range. About the city of Quito circle 20 snow-clad peaks from 15,000 to 22,000 ft. in height, many of which are active volcanoes. Through Ecuador the Andes form a double file, ranged close together and enclosing a broad plateau, the home of the greater part of the population.

Since Ecuador has great variation of elevation it has, in consequence, every variation of climate. Along the coast there is a small torrid region that recalls the fact that Ecuador is an equatorial country; at the summits of its mountains there is the chill of perpetual winter, but in the plains and plateaus there is unbroken spring. Here the climate is unexcelled, for the nights, mornings and evenings are cool and invigorating and the days are warm and bright. There is a difference of 10° between the temperature in the shade and in the sun, a change readily perceived as one goes from sunshine to shadow. The days and nights are of equal length, 12 hours, the year round. Colds and pulmonary diseases are almost entirely unknown.

PRODUCTS, INDUSTRIES, ETC. The differences of climate furnish a diversity of plant products. Bananas, pineapples, oranges and plantain are brought in from the lower slopes, while wheat, corn, potatoes and all the products of the temperate regions grow abundantly in the river valleys and upon the highlands. The growth of the crops is happily unhampered by insect pests, and even those harmful or merely annoying to man are wholly unknown. Flowers bloom in greatest profusion and climb over walls, houses and cathedral roofs in all seasons of the year. The mountains are heavily forested upon the western slopes, and there are the characteristic plants of a tropical wilderness, mimosas, cacti, euphorbias and agaves. The latter plants, sometimes called century plants because of a mistaken idea that they bloom but once in 100 years, are valuable to the Indians. With the dried leaves they thatch their huts; a sirup from stems and leaves is an addition to ordinary table

fare; fresh, the leaves may be used as soap; the spines form excellent pins; the fiber is woven into cloth for sacks or is made into sandals; the long flower stalks are strong enough for beams or ladders; and the flower heads boiled and treated in different ways make excellent jellies or pickles.

Other products of the forests of the eastern lowlands, as well as of the mountain slopes, are various palms, India rubber, copal, cocoa, vegetable ivory, quinine and bamboo. Cocoa is the leading export, and the great chocolate plantations are the largest in the world; the product of these trees furnishes one-third of the world's chocolate supply. The trees are under constant cultivation and are, in consequence, becoming more prolific. The other exports are coffee, rubber, tobacco, sugar, Peruvian bark, mangrove bark, alligator hides, cotton and Panama hats. The latter are manufactured almost exclusively in Ecuador and receive their name only because they reach the world through Panama. The demand for these always exceeds the supply. The mining products are gold, silver, copper, zinc, iron, lead and coal. It is said that the ancient Incas brought untold wealth from the mountain mines of Ecuador. The manufactures are chiefly of products for home use, and include cotton cloth, carpets, quilts and pottery. The pearl fisheries, once extensive are no longer valuable. A railroad now crosses the Andes through the Pass of Palmyra, 12,000 ft. above the sea; it is destined to connect Guayaquil, the chief port, with Quito, the capital.

PEOPLE AND GOVERNMENT. The greater part of the population is Indian; the rest are negroes, mulattoes and whites. While all races are said to be politically equal, the Indians are really in a state of subjugation and have no part in the government. On the whole, the people are generous, hospitable and interesting. The official title of the country is the Republic of Ecuador. Under the present constitution, adopted in 1906, the executive is a president

lected for four years and the legislative assembly is a bicameral congress. The president and vice-president are elected directly by the people, but the latter is elected two years after the former, so that he holds office during two administrations.

HISTORY. Ecuador anciently belonged to the Caras and then to the Incas, evidences of whom may still be seen in the remains of royal roads, strongly-built walls of stone and great palaces. After the Spanish conquest, till about 1800, Ecuador had no history, Spanish possession having brought about no settlements. For a time the country was under the jurisdiction of the viceroy of Lima, after 1822; then independent, it formed a part of New Granada, now Colombia, and on May 12, 1830, it became a free and separate state. With the inauguration of Vicente Rocafuerte, 1835, the country enjoyed the first peace in 25 years. Civil and constitutional government really began, and Ecuador, as a republic, was formally recognized by Spain. With the end of his term, turmoil again broke out. However, since Alfaro became president, 1897, the condition of the country has greatly improved. A boundary dispute is now pending with Peru; but one with Colombia has recently been settled, a commercial and naval treaty has just been concluded with Chile, and relations with foreign powers are peaceful. A national exposition, the centennial memorial of the rising for South American independence, opened at Quito, Aug. 10, 1909. Population, including uncivilized Indians, 1,500,000.

Ed'da, the name given two ancient collections of Scandinavian literature. The *Elder Edda*, which was discovered in 1643 by an Icelandic bishop, is a collection of poems probably dating from the tenth and eleventh centuries. They deal with myths and religious legends of an ancient Scandinavian civilization, and their verse form is extremely simple. The *Prose Edda* (Younger), which is thought to have been composed between 1140 and 1160, was arranged about 1222

by Snorri Sturluson. It is a prose account of the Northern myths and contains a treatise on the works of the scalds. The Eddas constitute one of the seven bibles of the world.

Ed'dy, Clarence (1851-), an American organist and composer, a pupil of Dudley Buck and afterwards of August Haupt in Germany. After returning to America he became organist of the First Congregational Church, Chicago, and in 1876 director of the Hershey School of Musical Art of the same city. Subsequently he was elected a member of St. Cecilia Academy, Rome. Among his writings are *The Church and the Concert Organist* and *The Theory of Counterpoint and Fugue*.

Eddy, Mary Baker Glover (1821-1910), the discoverer and founder of Christian Science, was born at Bow, near Concord, N. H. She was educated in the public schools, at Sanbornton Academy and by private tutors. When a young woman in Tilton, N. H., she married Col. George W. Glover and removed to Charleston, S. C. She resided in Charleston until the death of Colonel Glover, when she returned to her home in New Hampshire. Her mother, who was in failing health, died soon after this. The burden, sorrow and care which were thrown upon her impaired her health and resulted in a long period of illness. During this time she sought health in various ways and investigated many systems of healing but without permanent benefit. She had all her life been a close student of the Scriptures and a seeker after the highest possible spiritual attainments. In 1866, during a period of what seemed hopeless physical suffering, resulting from an accident, she reached such a realization of the present healing power of God as to cause her to be made whole. Writing of this experience in her autobiographical work, *Retrospection and Introspection*, Mrs. Eddy says:

"Even to the homeopathic physician who attended me, and rejoiced in my recovery, I could not then explain the *modus* of my relief. I could only assure him that the divine Spirit had wrought



MARY BAKER G. EDDY



EMINENT WOMEN

the miracle—a miracle which later I found to be in perfect scientific accord with divine law.

"I then withdrew from society about three years,—to ponder my mission, to search the Scriptures, to find the Science of Mind that should take the things of God and show them to the creature, and reveal the great curative Principle,—Deity.

"The Bible was my only textbook. It answered my questions as to how I was healed; but the Scriptures had to me a new meaning, a new tongue. Their spiritual signification appeared; and I apprehended for the first time, in their spiritual meaning, Jesus' teaching and demonstration, and the Principle and rule of spiritual Science and metaphysical healing,—in a word, Christian Science." (*Retrospection and Introspection*, pages 24 and 25).

From this time she devoted her life to teaching the doctrines of Christian Science, having first tested them by treating others. In 1875 she published *Science and Health with Key to the Scriptures*, the Christian Science textbook, which has been an epoch-making work. In 1877 she married Dr. Asa G. Eddy. The First Church of Christ, Scientist, in Boston, was founded in 1879, and Mrs. Eddy became its pastor. As The Mother Church, it sustained important relations to the other churches of the denomination as they were established, all Christian Science churches being branches thereof. Mrs. Eddy wrote and lectured much. As the leader of a great movement she was in constant demand. She retired from the active pastorate at the age of 70. During the remaining years of her life she continued to direct the movement she had established. Among her other works are *Christian Healing*, *No and Yes*, *Retrospection and Introspection*, *Unity of Good*, *Rudimental Divine Science* and *Miscellaneous Writings*. She founded the *Christian Science Journal* (monthly), the *Christian Science Sentinel* (weekly), *Der Herold der Christian Science* (German monthly), and the *Christian Sci-*

ence Monitor (daily), a newspaper for the home, designed by her to "injure no man but to bless all mankind."

Eddystone, *Ed' i stun*, **Lighthouse**, a lighthouse placed on the long Eddystone rocks in the English Channel. The present structure is the fourth built upon these rocks. The first, a wooden structure upon a stone base, was built in 1700 and was destroyed by a storm three years later. A second one of similar character was built in 1709, but was burned in 1755. The third was one of the engineering wonders of its day and is said to have been modeled on the trunk of an oak tree. It was built of great stone blocks dovetailed into the foundation rock and also dovetailed together. The tower was 85 ft. high and the light could be seen for 13 m. The rock upon which this lighthouse stood gradually became worn away, and the present tower, completed in 1882, was constructed upon a neighboring reef. It is on the same plan as its predecessor, but is higher, and its light is visible for a distance of 17½ miles.

Edelweiss, *A' del vise*, a low, flowering herb of the Composite Family. It is found throughout central Europe, mainly in Alpine regions. The leaves, stem and flowers are covered with a thick, woolly coat which protects it from the cold and helps it to retain its moisture in dry weather. Edelweiss is the national flower of Switzerland.

E'den, **Garden of**, in the book of *Genesis* the place where the first man and woman, Adam and Eve, had their abode. Authorities have never satisfactorily determined its exact location, but it was probably located in the Euphrates Valley. The term *Eden*, signifying pleasure or delight, is frequently used in a figurative sense in literature, as in the following line from Tennyson's *Locksley Hall*: "Summer isles of Eden lying in dark-purple spheres of sea."

E'denta'ta, an order of Mammals whose distinguishing mark is their lack of incisor teeth. It includes such animals as the sloths, armadillos, anteaters and pangolins, all of which have very

simple, rootless teeth. They are terrestrial or arboreal animals with long, curving claws and hairy or horny protective covering. They live only in the warmer regions, where they are nocturnal in habits, and where they can easily procure vegetable or insect food without any great activity. Their long claws are their only weapons, although many are able to enfold themselves within their platelike armor, and others acquire peculiarly protective coloration. See SLOTH; PANGOLIN; ANTEATER; ARMADILLO; ZOOLOGY, subhead *Classification*.

Edgeworth, *Ej' wurth*, Maria (1767-1849), an English novelist, born in Black Bourton, Oxfordshire. She is at her best in delineations of Irish life and landlordism and in tales for children. Every novel yields a moral lesson, but humor and freshness of material enliven all her work. She wrote *Castle Rackrent*, a story which suggested to Sir Walter Scott the effectiveness of true local color as a background, *Moral Tales*, *Belinda*, *Leonora* and *The Parent's Assistant*, a collection of stories for children.

E'dict of Nantes, *Nants*. See NANTES, EDICT OF.

Edinburgh, *Ed' n bur o*, the capital of Scotland, situated on the south of the Firth of Forth, 396 m. by rail n. of London. The old and new towns are divided by a deep ravine now covered with the gardens of Princes Street and connected by the North Bridge, Waverley Bridge and the Mound, on which are built the National Gallery and the Royal Institution. On a bold rock in the center of the city rises the castle, commanding a view of one of the most beautiful capitals of the world. This castle has served both as a home and a prison for many Scottish rulers, and the present building dates from the 14th century. Other buildings of prominence are the Parliament House, containing the large Advocates' Library and the Signet Library, the Palace of Holyrood, the Royal Institution, Victoria Hall, the Parish Church of St. Giles, the old Tron Church, the post office, the general Register House, the Museum of Science and

Art and the University of Edinburgh. Definite attempts have been made to better the housing conditions of the working classes. The Royal Infirmary is one of the best-equipped hospitals in Europe. The educational facilities are exceptional and several charitable institutions are maintained. Among the monuments of distinction are those of Scott and Burns and the national monument commemorating the victory of Waterloo.

The reputation of Edinburgh as a center for the printing industry has become traditional, and of the publishing houses those of Blackwood and Chambers have enjoyed enduring fame. The manufacturing industries include brewing (the best ale of Scotland as well as the bulk of it is brewed here), iron founding, coach building and the production of furniture and paper. Young trees are reared in nurseries around the town; white freestone furnishes good building material and quarrying gives employment to large numbers. Scottish customs and pastimes still prevail, and even though railroads and manufacturing interests have changed the character of the city it is markedly individual, and because of its literary fame, as well as its beauty, deserves the name "Modern Athens." Its history dates back to the seventh century when Edwin, King of Northumbria, is supposed to have built the castle. As the capital of the kingdom it witnessed many critical events in the history of Scotland, but after the union with England in 1707 much of its political influence and prestige was lost. Population in 1905, 336,577.

Edinburgh, University of, at Edinburgh, Scotland (1852). It was established by a charter granted by James VI and was first known as the "College of James VI." It was under the control of the town council and remained thus until as late as 1858. There are at present six faculties: divinity, law, medicine, arts, science and music, and a special school is provided for women. The medical school has attained especial fame and enrolls students and physicians from all over the world. Many of the build-

ings are of great historic interest, although there are many that are modern in construction and equipment. The library contains over 200,000 volumes besides a large number of volumes in the theological library.

Ed'ison, Thomas Alva (1847-), a great American inventor. He was born at Milan, Ohio, of Dutch and Scotch ancestry, and in early boyhood received the rudiments of an education from his mother, a former teacher. At 12 he became a newsboy on trains between Port Huron and Detroit. At 15 he began to sell with his other papers the *Grand Trunk Herald*, which he edited and printed. Having learned telegraphy he soon became expert; and at 17 he had invented an automatic repeater which transferred messages from one wire to another and thus saved the time of an operator. This was the beginning of that marvelous career during which he has received patents on more than 700 inventions. The receipts of \$40,000 for an improved printing telegraph for stock quotations, enabled him to establish shops and laboratories at Newark, N. J. He removed to Menlo Park in 1876, and later to West Orange. He has employed hundreds of workmen, and for nearly 40 years has given all of his energy to invention. It is said that there is not an electrical instrument, or an electrical process now in use, but bears the mark of his genius. His inventions include the system of duplex telegraphy, later developed into quadruplex and sextuplex transmission, also the megaphone, the phonograph, a telephone for long distance transmission, a storage battery and the incandescent electric lamp now in common use.

Edmonton, a city of Canada, capital of the Province of Alberta, situated on the North Saskatchewan River and on the Canadian Pacific, Canadian National and Edmonton, Dunvegan and British Columbia Railways. It is 525 m. n.e. of Vancouver and 800 m. n.w. of Winnipeg. The valley of the river is thickly wooded, and the city is surrounded by a rich mixed-farming community. Edmon-

ton is the chief educational center of the province, the University of Alberta, with affiliated colleges, and other colleges being located here. The city has its own electric light and power system and telephone and water works. It has extensive livestock, dairy, milling and packing industries. There are 9 coal mines within the city limits and 24 on the outskirts. Gold, silver, and oil are also found in the environs. As a wholesale distributing center Edmonton occupies a leading place among western commercial Canadian cities. It is the headquarters for fur traders of the North, and has the largest traffic for raw fur of any city in the world. It was established in 1778 as a post of the North West Company, and when this was merged with the Hudson's Bay Company in the beginning of the 19th century, Edmonton assumed new importance as a Northern unloading point. In 1904 it was incorporated as a city. Population, 58,821.

Ed'munds, George Franklin (1828-1919), an American statesman, born in Richmond, Vt. He took up the practice of law and was a member of the Legislature of Vermont from 1854 to 1859, serving as speaker for three years. In 1861 he was elected to the State Senate and became United States senator in 1866, where he served until 1891, when he resigned. He was a member of the electoral commission of 1877. During the presidency of General Arthur he was president *pro tempore* of the Senate, and was a candidate for the presidential nomination in the Republican National Conventions of 1880 and 1884. He was the author of the act for the suppression of polygamy in Utah, known as the Edmunds Act, and of the anti-trust law of 1890. While in the Senate he was a member of a number of important committees, and exerted a powerful influence in securing the enactment of laws that were far-reaching in their effect. After his resignation he gained a wide reputation as a constitutional lawyer.

E'dom, in ancient times the mountainous tract between the Dead Sea and the Red Sea. Idumæa is the Greek form of the same name. *Edom*, signifying redness, was derived from *Esau*, the name of the eldest son of Isaac and Rebekah. Esau's descendants, called Edomites, occupied this land, which was originally known as Mt. Seir (*Gen. xxxvi*). The early Edomites were a warlike and

unsettled people and were often numbered among the enemies of the kings of Israel and Judah. They were in subjection to Israel from the time of David to about 732 B. C., in which year they appear among those forced to pay homage to Tiglath-Pileser III at Damascus. In 701 B. C. the Edomites united with Hezekiah against Sennacherib, then threatening Palestine. After the return of the Jews from exile the Edomites occupied a portion of southern Judah, with Hebron as a capital, but from this region they were driven in 164 B. C. by Judas Maccabæus. The last remnant of their independence disappeared at the time of the Roman conquest.

Ed'uca'tion, in its broadest sense the development of all the powers of man, but in its more restricted sense, the development of the mental powers. In its broadest scope the education of an individual begins at birth and ends with death. In the ordinary discussion of the subject the period covered is limited to the years spent in school, and extends from the kindergarten to the university and the professional school.

TYPES OF EDUCATION. Education is of two types, which may be styled individual and social. The first pertains to the development of the powers of the individual within himself to meet his personal needs. It includes physical education, a training of the body; intellectual education, or training of the powers of the mind; moral education, or training of the will; and religious education, which is designed to teach the individual his proper relation to a supreme being. The social type of education considers man from the viewpoint of his relation to society and especially to the State, and it is largely directed by the State, whose purpose it is to see that the individual becomes an intelligent and useful member of society; and in order that it may serve this end, it aims to control individual education to the extent of establishing systems of schools, preparing courses of study and enacting compulsory education laws.

Between these types of education there always has been more or less conflict,

notwithstanding the fact that each is the complement of the other, and until this fact is fully realized the conflict will not cease. Moreover, not until these types unite upon that higher plane in which each fully recognizes its relation to the other will true harmony of life be attained through any system of education.

HISTORY

NATIONS OF ANTIQUITY. Education is as old as the human race, for every tribe, however low its state of civilization, trains its children and youth in the arts and occupations necessary to maintain existence, but the discussion of these primitive systems is not essential in the general history of education, and we pass at once to the consideration of national systems, discussing them in their chronological order.

The nations of antiquity include the ancient Oriental nations, among which Egypt, Persia, India, China and the Hebrew nation are worthy of mention for their systems of education. In all these systems the individual type of education was scarcely considered. The youth was fitted merely to fill his place in the social system. All individuality was forced to yield to an external despotic authority, which determined the character of education. With the exception of the Chinese, whose education was chiefly moral and literary, with ancestor worship for its religious phase, the systems were founded upon the religious belief of the people and instruction was in the hands of the priests. In India it developed and perpetuated the caste system; in Persia it was subservient to the State; and among the Hebrews it was founded upon a theocracy.

THE ANCIENT CLASSIC NATIONS. These nations include Greece and Rome, and in their systems we find the beginnings of later systems, from which were evolved the systems now in use.

Greece. In Greece there were two systems, the military system of Sparta, whose sole aim was to make soldiers; and the more liberal system of Athens, which combined music and literature

with physical training, and which recognized the inherent rights of the individual while it trained him for citizenship. Under both systems the education of girls was confined to training in domestic duties. As a result of the highest development of the Athenian ideal of education, we have the philosophy of Aristotle and Plato and a degree of culture, though shared by but few, which in some respects has never been surpassed, and whose influence upon education and cultural ideals has continued to the present day. Unfortunately in later years, when the Greek states lost their independence, civic ideals were also lost; higher education became purely intellectual, and its connection to civic and social life became more and more remote.

Rome. During the early years of the republic, Roman education was given entirely in the family. The father was responsible for the training of his sons, and was censured if this duty was not well performed. The education consisted in training in moral, civic and religious duties. The mother was equally responsible for training the girls in household duties and domestic virtues. In Rome woman was on a higher plane than in any other nation and her influence was correspondingly greater. Early Roman education was practical, but from an intellectual viewpoint it was extremely narrow. After the conquest of Greece, Greek culture was added and schools were established, which, during the reign of Augustus, were developed into a well-defined system, including elementary schools, secondary schools and institutions of higher learning. This was the beginning of an educational system destined to spread over Europe and in modified form to continue to the present day. However, the educational system of Rome was not able to stem the tide of luxury, which in time led to the decay of her civilization and the fall of the empire.

EARLY CHRISTIAN EDUCATION. This period extends from the introduction of Christianity to the beginning of the 16th century, and is concerned chiefly with

the nations of Europe. The founder of Christianity introduced a new philosophy which tended to revolutionize the social customs of Oriental nations, and in time revolutionized education in Europe. The doctrine of equality of men—that God was no respecter of persons—did away with caste, and the elevation of marriage to a divine institution placed a sacredness upon the family never before recognized. Moreover, children were considered as a divine gift, to be reared and educated to a devout life instead of being exposed to perish, as was often customary among heathen nations. Christianity was introduced into Europe just as the Roman Empire began to decline, and when the empire was overthrown by the vigorous though less cultured Teutonic nations, it had a sufficient hold to enable it to secure many followers among these so-called barbarians, who in the coming centuries were to wield the destinies and mold the civilization of the Western world.

The Early Christian Fathers. The early followers of Christianity were unlearned men, and naturally lacked that breadth of view possessed by the more cultured Greeks and Romans. It was equally natural that the early Christians should associate the vices of the Romans with this culture. During the first few centuries Christian education was limited to teaching the Scriptures and the doctrines of the Church. It was practically confined to the clergy and was under the control of the Church.

The early Christians believed the body to be the seat of sin, and that the more the body was repressed the greater was the opportunity to develop the spiritual life; therefore, many of the clergy and monks lived lives remarkable for their self-denial and often for their suffering. Monasteries were established throughout Europe and became the repositories of learning. All teaching was in Latin and the mother tongue was ignored. In general, during the first four centuries the works of the Greek and Roman writers were considered unchristian, and, therefore, dangerous. However, a few expur-

gated works were read, but most of the studies pertained to theological subjects. Later the prejudices against heathen authors was overcome. It was discovered that some knowledge of the philosophy of Plato and Aristotle, for instance, was of material assistance to the intellectual understanding of Faith. Many of the ancient manuscripts were copied in the monasteries and thus preserved for the coming centuries. Another important result of the education of this period was such modification of Latin as to make it a living language. Many new words derived from theological doctrines and discoveries were introduced and many old forms became obsolete. Thus was formed medieval Latin, from which the Romance languages were largely derived.

Charlemagne. The first great revival of learning in Europe was due to Charlemagne. During the barbarian invasions most of the culture of the former period was suppressed, and it was largely due to the Mohammedan schools that it was not entirely lost. Notwithstanding the fact that the modification of Latin made it a living language, this modification was accomplished by the corruption of many classical forms, and the language was in danger of losing its character. Charlemagne's reform first addressed itself to the restoration of classic models and to the spread of a broader culture. He gathered about him the leading scholars of his time and established a school at his court, known as the Palace School. He also established bishops' schools and monastic schools throughout his vast empire, and required the priests to establish schools in villages and teach the children reading, arithmetic and music. His system of schools was well under way when the great Emperor died. See CHARLEMAGNE.

In the two centuries which followed, political disturbances and the desire of monarchs to rule by force over ignorant subjects resulted in neglect of public education. But a few schools were maintained; the studies were divided into two groups, the first including grammar, rhetoric, dialectics and arithmetic; the

second, music, geometry and astronomy. These subjects constituted the seven liberal arts.

Scholasticism. The second awakening occurred at the beginning of the 12th century. The chief characteristic of the movement was the undue prominence given abstract reasoning, or sylogistic reasoning. Because of this characteristic the period was known as the Age of Scholasticism. Scholasticism was based upon truths previously acquired and formally stated. It led to no original thinking, and instead of advancing learning, held it bound by old traditions. The authority of the Church was generally accepted in matters of religious belief, and Aristotle, so far as he was approved by the Church, was considered authority on all knowledge pertaining to the world. Notwithstanding its narrowing tendencies, however, Scholasticism rendered great service to education, for the movement resulted in the establishment of universities, which from their foundation have wielded a controlling influence in matters educational. See UNIVERSITIES.

The rise of the universities led to the establishing of many schools of lower grade in which instruction in reading, grammar, arithmetic and music was given to all boys who came. Girls were instructed in the home and in women's monasteries. Owing to the classes into which feudalism had divided society, there were two types of education, that designed for young men who were to become knights, called knightly education, and that designed for those who were to engage in commerce and other lines of business. With the decay of feudalism, knightly education waned and finally disappeared. The invention of printing in the first half of the 15th century led to the rapid advancement of education, since within a half century from the time of this invention books were practically within reach of all. As the knowledge of the material world increased, Scholasticism lost its influence.

THE RENAISSANCE (new birth). Many causes contributed to the great awaken-

ing of the 16th century. Chief among them were the invention of printing (See PRINTING); the Crusades and the extension of knowledge and commerce resulting from them (See CRUSADES); explorations by which America and other unknown lands were discovered, and a water route was found to the Orient; and the development of factions within the Church. The educational phase of the Renaissance had its beginning in Italy, the home of the brilliant writers, Dante, Petrarch and Boccaccio. For more than two centuries the cities of northern Italy had maintained a culture in advance of that in other parts of Europe, and in the latter part of the 15th century they had attracted scholars from other countries. These returned imbued with the spirit of the great Italian writers and awakened a desire for more extended literary culture.

The Reformation. But the most potent of all causes was the dissension within the Church, which resulted in the Reformation and the establishment of Protestantism. Martin Luther, the leader of the movement, was a firm believer in the education of children; first, for its effect upon the child and, secondly, because of the relation of the child to the Church and the State. Under the impetus of the new religious movement, schools for teaching the mother tongue and other common branches were established throughout all Protestant communities, and during the century educational systems very much like those found to-day were established (See REFORMATION, THE; LUTHER, MARTIN). The educational movement by those who revolted from the Church produced an awakening within the Church itself, and the clergy began to give greater attention to education. The Order of Jesuits was founded, and under the skillful leadership of their founder this society became one of the strongest educational forces the world has ever known. See JESUITS; LOYOLA, SAINT IGNATIUS OF.

The Humanists. The early Christian Fathers and their followers for more than 16 centuries gave prominence to the

Scriptures and doctrines derived from them, and later they added the expurgated writings of the Greek and Roman writers. As education advanced, theology, philosophy and grammar, which included the study of language and literature, were emphasized. These subjects were styled humanities, and in the 16th century their advocates became known as Humanists. They based their teachings on the works of their predecessors. Their method was dogmatic. They placed the word above the idea for which the word stood and made learning a process of memorizing. Yet they were inspired by lofty ideals of holy living. Their influence was almost beyond estimate, and their educational system became so firmly entrenched that for the next two centuries the Greek and Latin classics were given first rank in the curriculum of every college and university in Europe and America. Among the most conspicuous of the Humanists were Erasmus, Melancthon and John Sturm, who was the progenitor of the graded school.

The Realists. The Realists were in sharp contrast to the Humanists. Their origin dates from the advent of the inductive philosophy, said to have originated with Lord Francis Bacon (See BACON, FRANCIS; INDUCTIVE METHOD). Bacon's system of reasoning was directly the opposite of that of the Humanists. He proceeded from direct observation of individual objects to build up class, or general, notions. He believed that to make the ancient classics the chief subjects of study was detrimental to all progress; he, therefore, superseded the realm of letters with the realm of nature and attempted to reconstruct the entire field of knowledge. Though he did not fully succeed he instituted that method of investigation which lies at the foundation of the development of modern science and the practical phase of education so strongly in evidence in the 20th century.

Among Bacon's followers who have made a strong impression upon methods of instruction were Ratich, whose aphorisms contain principles now recognized

as constituting the foundations of the most widely accepted theories in vogue at the present day; and Comenius, who was the first successfully to apply Bacon's method to the instruction of children. His book, *The Gate of Tongues Unlocked*, was epoch-making in that it revolutionized the methods of teaching in all the countries of Europe and in some in the East. He was also the author of the first textbook to contain illustrations. See RATICH, WOLFGANG; COMENIUS, JOHANN AMOS.

Results. The rise of Protestantism had a lasting effect upon education, but progress was not without interruption. At first the effect upon many of the universities was such as to weaken their influence or compel them to suspend. Wherever the faculties joined the new religious movement, the Church withdrew its support from the university and left it for a time without resources. Again, the teaching in most of the schools was not in harmony with the thought and spirit of the age and tended to arouse bitter controversies, such as those between the Humanists and Realists. Bacon and Comenius were far in advance of their time and it was years before their methods were generally accepted. Yet during the 16th century public education became more firmly and generally established than at any previous time, and, notwithstanding the influence of the Humanists, the mother tongue and common branches continued to gain ground. The education of girls also received more attention. The systems and courses of study established in the 16th continued through the 17th century with but little change.

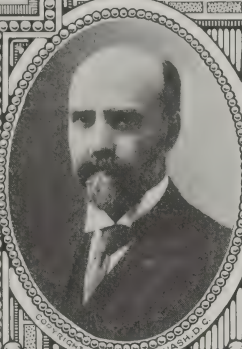
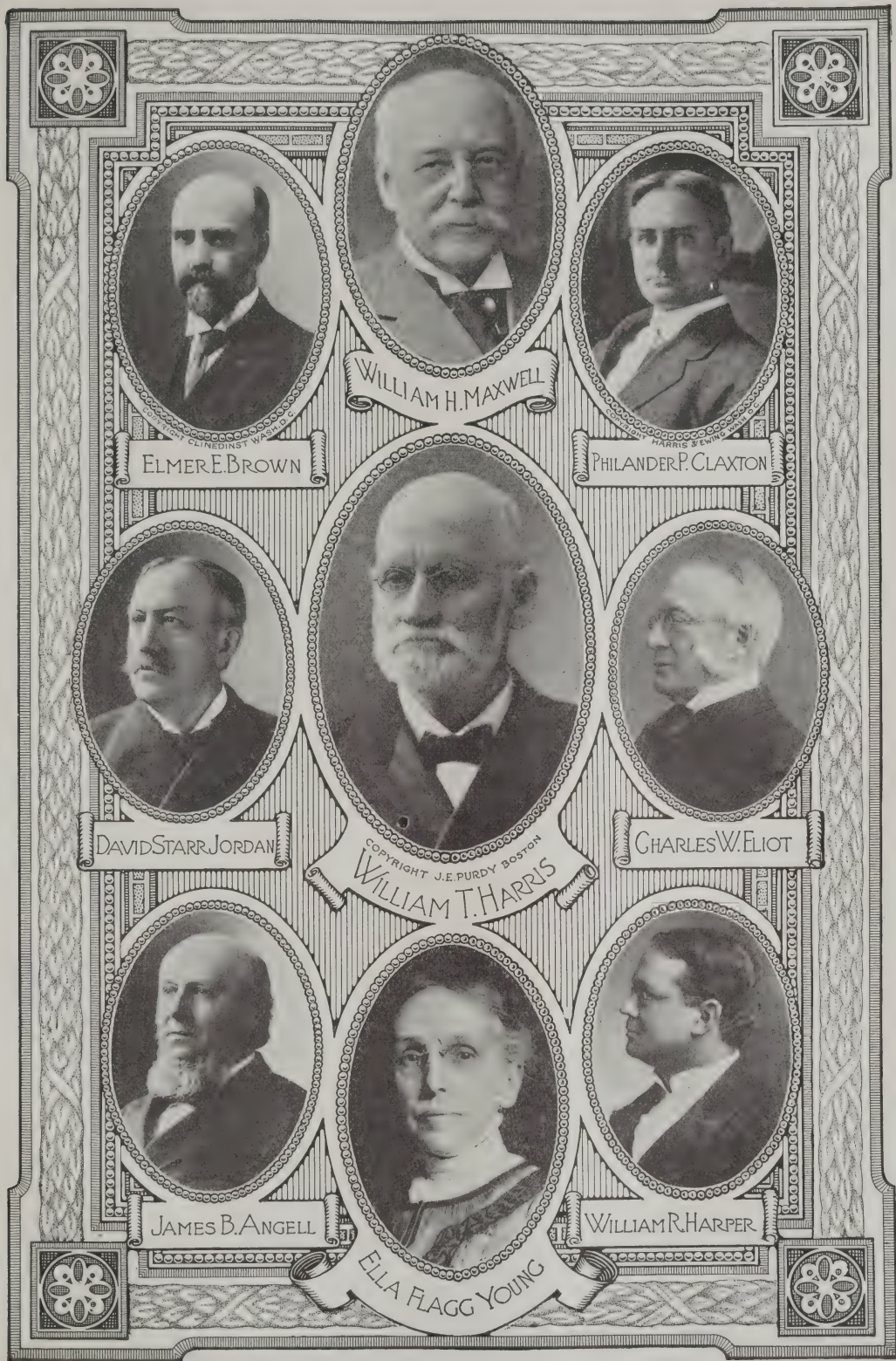
THE NEW EDUCATION. The 18th century was a period of unrest in political, religious and educational affairs. During this time most of the nations of Europe became established very much as they are today. In religion and education there was a strong reaction against the dogmatism of the Church and the schools. Freedom of the individual and the training of all the child's powers began to receive recognition. The rise of

these doctrines led to bitter controversies between Humanists and Realists, in which the latter gradually gained ground. The methods of Comenius were revived and placed on a permanent basis by Pestalozzi. The writings of Rousseau exerted a strong influence in securing greater freedom in the education of children, and systems of public education became nationalized. The study of the various branches of natural science became common, and all were taught to read and write their native language. In short, whereas the education of the 16th and 17th centuries had been religious, that of the 18th was practical; instead of devoting most of its strength to preparing men for death, it prepared them for life.

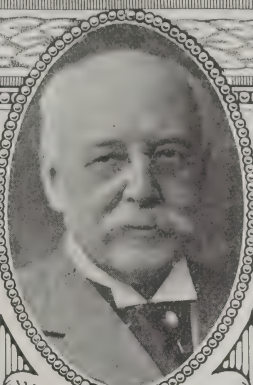
The great movements which began in the 18th century were thoroughly organized and established in the 19th. The kindergarten is universally recognized as a department of elementary schools. Systematic and scientific child study constitutes a part of the preparation of every thoroughly equipped teacher. The subject matter of education has been recognized to meet the needs of the age and the various departments of knowledge have been properly related and coordinated, and methods of teaching have been made to conform to the laws of psychology. Moreover, public education has become preeminently a function of the State. The public schools are open to all on an equal footing and in enlightened countries elementary education is compulsory. Through the public schools and state universities, opportunities to receive the highest culture and most complete equipment for life are offered free of charge to the youth of the United States. See EDUCATION, NATIONAL SYSTEMS OF; NORMAL SCHOOL; PEDAGOGY; CHILD STUDY. Consult Painter's *History of Education*; Compayré's *History of Pedagogy*.

Education Association, National. See NATIONAL EDUCATION ASSOCIATION.

Education, Commissioner of, in some states, as Ohio, the title of the chief educational officer. When used in this sense



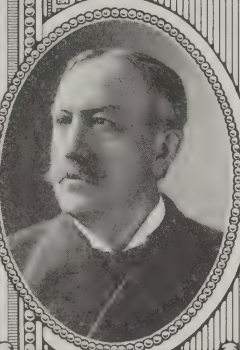
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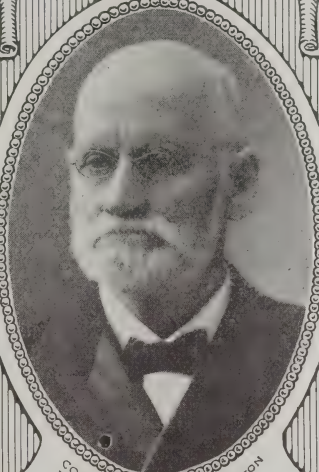
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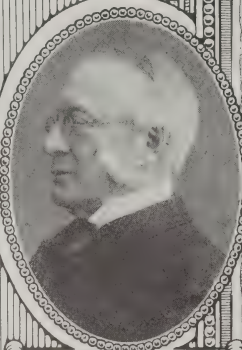
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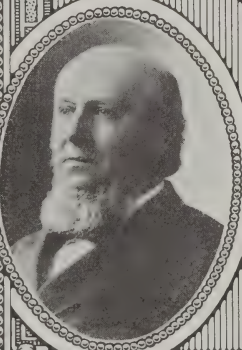
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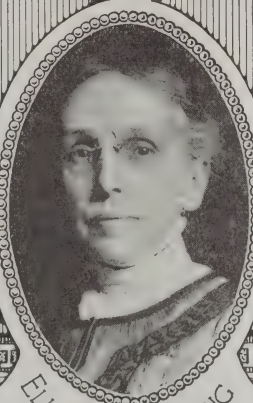
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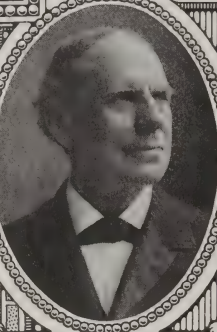
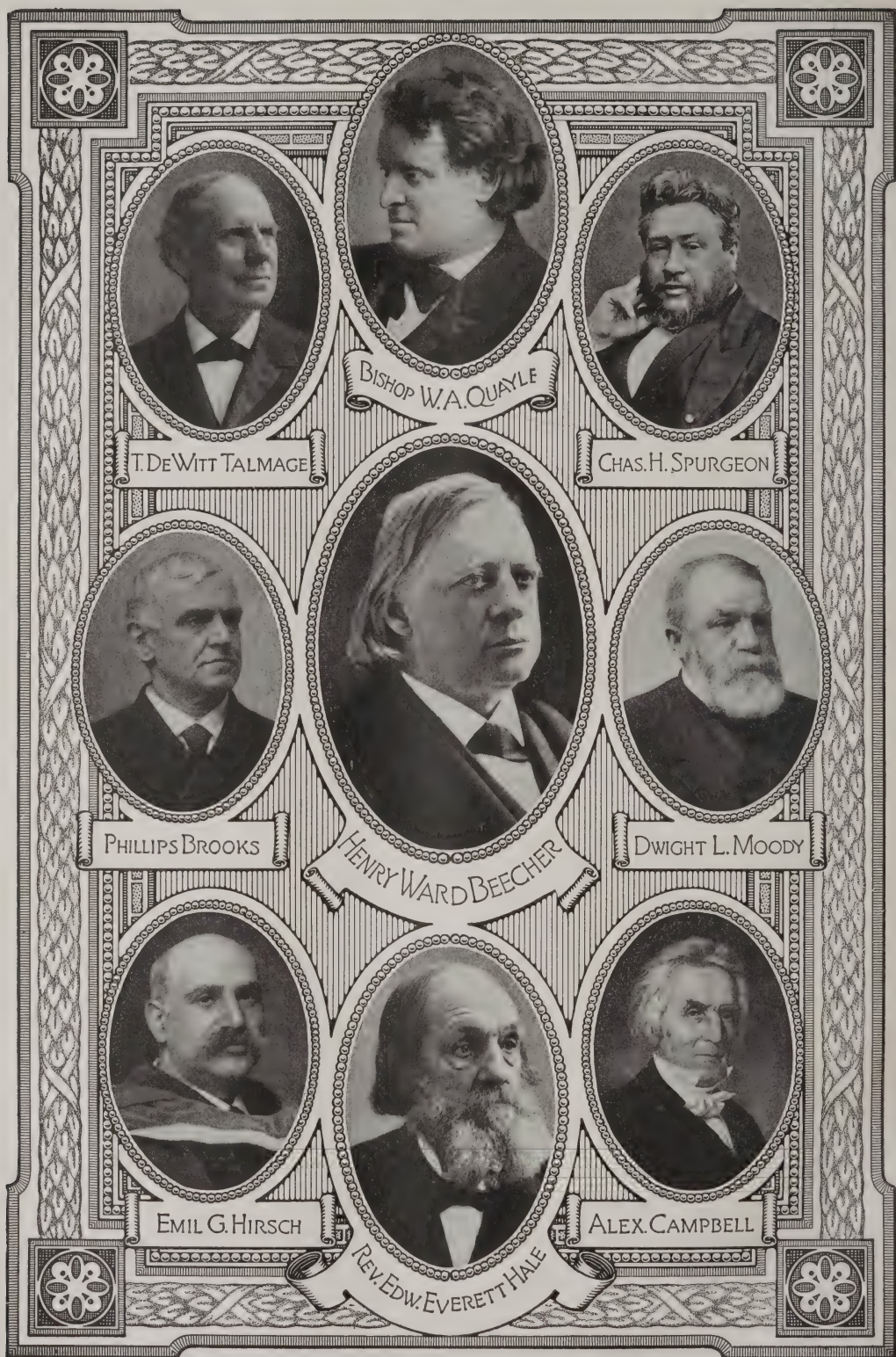
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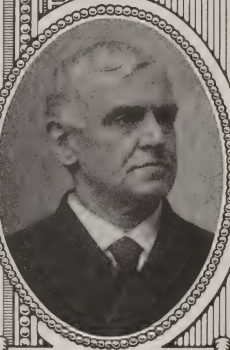
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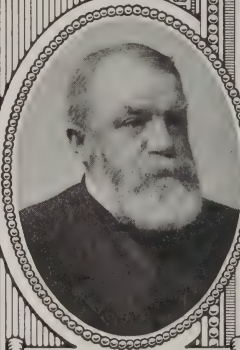
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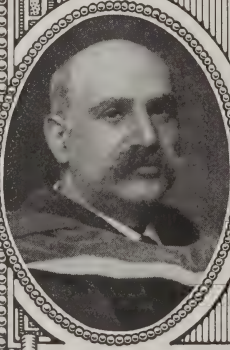
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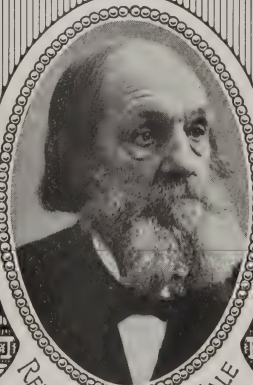
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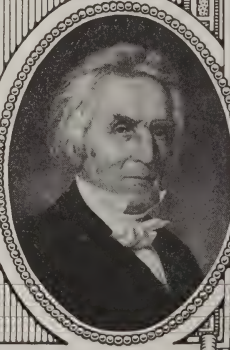
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EMIL G. HIRSCH



REV. EDW. EVERETT HALE



ALEX. CAMPBELL

EMINENT DIVINES

the title is synonymous with that of superintendent of public instruction. The United States commissioner of education is the chief officer of the National Bureau of Education. He is appointed by the president with the advice and consent of the Senate. He collects and publishes information upon systems and methods of education in the United States and in foreign countries, and makes an annual report to Congress, setting forth the work of the bureau. These reports contain much valuable information and are in demand by educators throughout the country. The duties of the commissioner of education are largely advisory, but from his ability to gather information from all parts of the country his suggestions usually have a far-reaching import. The office was established in 1867, and Henry Barnard was the first commissioner. See BARNARD, HENRY; HARRIS, WILLIAM TORREY; BROWN, ELMER ELLSWORTH; CLAXTON, PHILANDER PRIESTLEY.

Education, Compulsory, that feature of an educational system which requires children between the ages specified to attend school a portion of each year, unless they have already acquired the knowledge imparted in the public schools. Laws requiring attendance upon military instruction were in force in Sparta and Athens some centuries before the Christian Era, and the principle underlying those laws has never been lost. At the present time all the leading nations of Europe have compulsory education laws, and all states in the Union either directly require attendance at school, or indirectly compel it by not allowing children who have not attended school the required length of time to engage in any gainful occupation. The age varies in different states, from 5 or 7 to 14 or 16. The parent may select the school, but the law usually requires that the common branches of learning be taught. Compulsory education laws are based upon two principles. First, since all citizens pay taxes to support public schools, the children of all citizens should receive the benefit of these schools. Second, that intelligent citizens are essential

to the safety and perpetuation of the State; therefore as a matter of self-protection, the State has the right to require the education of all children within its boundaries.

Education, Industrial. European schools which might be classed as industrial would include reform schools, trade schools and continuation schools. Of these each contributes largely to the uplift of those enrolled. In the United States the term *industrial* is so used that it becomes necessary to consider several classes of institutions. There are, for instance, some 75 industrial schools for Indians. These enroll about 14,000 pupils, most of whom receive instruction not only in the trades but also in those subjects commonly taught in the graded schools of towns and cities.

Of the many institutions for negroes, a large proportion are designated as industrial, or normal and industrial, schools; while many others offer quite as complete industrial courses. The establishment of some 50 so-called land-grant colleges, open to whites alone or to both whites and blacks, and supported in part by Federal appropriations, has resulted in the organization of about 20 such institutions in the Southern States for those of the colored race. These afford opportunity for the negro of the South to secure a technical training beyond that commonly afforded in the industrial schools for his race, and thus fit him to supervise industrial work.

Business and commercial schools are sometimes classified as industrial, but will not be so treated in this article. Economic and social conditions being what they are in America, it is not surprising that trade and industrial courses are offered by many institutions which also perform quite different functions. Some technological institutions that maintain regular colleges of engineering, and very many polytechnic institutes, schools of technology and public and private manual-training high schools offer both day and evening industrial courses.

Those city, county or state institutions formerly designated as reform schools

have now very generally become industrial schools. These are for boys, or girls, as the case may be, assigned to them both (1) in order that they may be removed temporarily from an unfavorable environment, and (2) that they may have opportunity to acquire (a) such of the rudiments of a good common school education as they have not yet mastered, (b) learn some trade that has proven reasonably dependable as the means of a livelihood, and (c) gain a wholesome view of their duties to their neighbors and to the State. The approximately 120 public schools of this character today offer a training not inferior, and in some respects often quite superior, to that of the average local public or private school of equal grade. They hold properties valued at more than \$35,000,000, have an annual income of perhaps \$9,000,000 and enroll annually about 60,000 different pupils, having an average attendance of perhaps one-half that number. See UNITED STATES INDIAN TRAINING AND INDUSTRIAL SCHOOL; NEGRO, EDUCATION OF THE; TRADE SCHOOLS.

Education, National Systems of. In nearly all countries except the United States the system of public education is under the direct control of the national government.

FRANCE. France has the most highly organized educational system under a central authority in the world. The system of instruction is divided into three departments, primary, secondary and higher. The minister of public instruction, who is a cabinet officer, is at the head of the system. He is assisted by the superior council of 57 members. Each of these departments has a special director and there are also general inspectors. For purposes of administration the country is divided into 17 districts called academies. Each academy comprises the universities, colleges, classical schools and public primary schools within its limits. A rector and academic council and an inspector are at the head of each academy. Primary inspectors, who come in direct contact with the schools, serve under the academy inspect-

ors. The academies are divided into departments, each under a prefect who has the power of appointing elementary teachers, and there is also an advisory council for primary schools. The mayor and council of the communes provide school sites and vote funds for local school expenditures. The teachers are paid by the State.

The primary schools include maternal schools, elementary primary schools, superior primary schools, apprentice schools and primary normal schools. Each commune is required to maintain a primary school and in communes of over 500 inhabitants separate schools for boys and girls are required. A university is organized in each academy and there are higher normal schools which prepare teachers for the primary normal schools. Secondary and higher education, formerly in the hands of the Church, are now under the control of the State.

GERMANY. The school system of Germany is practically that of Prussia. The system is divided into three departments, elementary, secondary and higher. The main purpose of the elementary department is to educate the children of the lower classes, whose school training seldom extends beyond this department. The secondary department prepares pupils for the universities and professional schools.

There are five classes of elementary schools: (1) The infant schools, which are not supported by the State. (2) The *Volks-schule*, which contains children between 6 and 14 and corresponds most closely to the elementary school in the United States. Attendance upon this school is compulsory, unless the education it gives is otherwise provided. In large communities there are separate schools for boys and girls. (3) The continuation schools, which are usually evening schools and receive pupils between the ages of 14 and 18. (4) The middle schools, which aim to prepare their pupils for business or to enter secondary schools. Among the middle classes these schools take the place of the *Volks-schule*. (5) Normal schools.

Secondary education is provided by the Gymnasias and the Realschulen. The former are the classical schools and the latter emphasize the sciences and modern languages. The courses require six years, but the higher Realschulen have special courses requiring nine years. These schools prepare for practical life and for the universities.

The minister of religious, educational and medical affairs is at the head of the educational system. In Prussia each of the 13 districts constitutes a division for school administration. These provinces are divided into 36 governments, each of which has its board of education. The governments are again divided into districts, the largest of which have inspectors who devote their entire time to supervision. There is a local board in each district which has the power to erect school buildings, organize schools, determine the teacher's salary, increase pensions and decide upon what property is liable to taxation for school purposes. Teachers must be professionally trained, and teaching is a life profession, with a pension upon retirement.

For thoroughness, efficiency and practical results the public schools of Germany are not excelled by those of any other nation. Industrial training receives special attention in all grades of schools.

GREAT BRITAIN. The board of education for England and Wales has general direction of public education in Great Britain. The board consists of the lord president of the council, the principal secretaries of the state and the chancellor of the exchequer. This board has charge of three departments of instruction, elementary, secondary and technological. The system of elementary schools has been reached after many changes, which extended through a long period of years and involved a controversy between two classes of schools, known as board schools and voluntary schools. The board schools derived their support from public funds raised by taxation. They were secular schools and made no special provision for religious instruction. The voluntary schools, on the other hand, re-

ceived the greater part of their support through private contributions. These schools were under the direction of religious denominations, chiefly the Church of England and the Catholic Church, and made provision for both secular and religious instruction, very much as do the parochial schools in the United States. Since the voluntary schools gave instruction to many more pupils than the board schools, from time to time they appealed to Parliament for such legislation as would give them a portion of the public funds raised for school purposes. In 1897 some relief was granted, but the controversy did not cease, because the voluntary schools demanded equal financial treatment with the board schools.

The Education Act of 1902 sought to establish a national system of education and to unite these two systems of elementary schools. The act made the council of every county and every country borough the local educational authority for all matters pertaining to both higher and elementary education. The local school boards and attendance committees were abolished and their powers and duties transferred to the council. The name of the board schools was changed to council schools. The management of council schools in counties was placed in charge of six managers, four of whom are appointed by the council and two by the borough, parish or urban district council, as the case may be. The voluntary schools are also under control of a board of six managers, four of whom are known as "foundation managers" and may be appointed in accordance with the trust deed of the school or by the order of the board of education. The other two are appointed by local authorities. Councils are required to maintain free elementary schools, the expenses of which are provided for by taxation. Since this bill did not provide for religious instruction it met with strenuous opposition from the Church authorities, and after the law became operative some refused to pay the tax, and this refusal became the foundation of a strenuous political campaign; but the law has continued in force.

Attendance upon elementary schools between 7 and 13 years is compulsory. Evening schools are maintained in which industrial training is given. Secondary education is supported partly by the State and partly by endowments and benefactors. All schools receiving aid from the State are under control of the board of education.

OTHER EUROPEAN COUNTRIES. Switzerland has no national system of education. Each canton has control of the public schools within its boundaries. The support for the common schools is derived from general and local taxation. The Austrian system is patterned after that of Germany. Italy has an organic system, extending from the elementary schools to the university, but the laws pertaining to education are not enforced and there is a high percentage of illiteracy in the country. Conditions in Spain are similar to those in Italy. Netherlands has a very complete and somewhat complex system. Extending from the elementary schools to the university and including normal schools and agricultural schools, the system includes both government schools and subsidized private schools. Subsidies are granted private schools only on condition of compliance with government requirements. Sweden and Norway both have excellent systems of education, extending from the elementary schools to the university. All are supported by local and general taxation. Attendance upon the elementary schools is compulsory, and the percentage of illiteracy in these countries is remarkably low.

CANADA. By the British North America Act education within the Dominion was left to the jurisdiction of the separate provinces. In general, the educational system of each province is under the direction of a board of education and a superintendent of public instruction who is appointed by the lieutenant-governor of the province, with the advice and consent of the council. All provinces maintain free elementary schools, but the local management varies, owing to the difference in population and needs. See

the subhead *Education* in the articles describing the respective provinces.

UNITED STATES. For a description of the educational system in the United States see COMMON SCHOOLS.

Ed'ward, the name of seven kings of England. Edward II (1284-1327) succeeded to the throne in 1307 upon the death of his father, Edward I. He invaded Scotland in 1314 and was defeated by Bruce at Bannockburn. His weakness and domination by foreign favorites led to frequent revolts, and he was finally imprisoned and murdered by a conspiracy of his wife and his great nobles. Edward IV (1442-1483), upon the death of his father, Richard Duke of York, became the head of the Yorkist Party in its contest with the House of Lancaster in the "Wars of the Roses." Defeating the forces of Henry VI in the Battle of Mortimer's Cross (1461), he entered London in triumph and was proclaimed king, strengthening his position further by the victories of Towton and Hexham. He offended the powerful Duke of Warwick by his marriage and was compelled to take refuge in Holland; but returned in 1471, defeated Warwick and was restored to the throne (See ROSES, WARS OF THE).

Edward V (1470-1483) succeeded to the throne at the age of 13, upon the death of his father, Edward IV. He was soon imprisoned in the Tower, with his younger brother, by their uncle, Richard Duke of Gloucester, who had been appointed protector of the kingdom. The princes were never again seen, and are supposed to have been murdered by the orders of their uncle, who had himself proclaimed king as Richard III. Edward VI (1537-1553), the son of Henry VIII and Jane Seymour, succeeded to the throne at the age of ten upon the death of his father in 1547, and reigned for six years under the protectorate of the dukes of Somerset and Northumberland. During his brief reign commercial reforms were instituted and the religious reforms of Henry VIII were still further established. See EDWARD I; EDWARD III; EDWARD VII.

Edward, surnamed the Confessor (about 1004-1066), King of England, the son of Ethelred II. He was born at Islip in Oxfordshire, but passed his youth in Normandy. He was recalled to England in 1041, by Hardicanute, whom he succeeded as king in 1042, thus restoring the old English line, after a quarter century of Danish rule. Edward's partiality for the Normans caused much dissatisfaction among the members of the National Party, led by Earl Godwine and his sons, who had practical control of the government for a number of years. Edward had monkish rather than kingly qualities and showed little inclination for the affairs of government. His most enduring work was the founding of Westminster Abbey. He was canonized in 1161 by Pope Alexander III, who conferred upon him the title of Confessor.

Edward I (1239-1307), successor of Henry III as King of England. Returning from a crusade in 1273, he was informed at Capua of his father's death, and was crowned the next year. Early in his reign he subdued the Welsh under Llewellyn and in 1284 annexed Wales to the English crown. He engaged in a long contest to conquer Scotland, securing a foothold when appeal was made to him to decide between the various claimants to the throne. During the struggle he defeated John Baliol in 1296 and drove him into exile, taking back to England the famous Stone of Scone. In 1305 he defeated William Wallace and had him beheaded. But no sooner had he organized the new government of the country than another uprising occurred under the younger Robert Bruce. Thereupon Edward, now weighted with years, undertook to invade Scotland again, but died within sight of the country. Edward also engaged in a conflict with France, which, however, accomplished little. The chief significance of his reign lies in the fact that in order to secure the cooperation of his own subjects for his various enterprises, he convoked, in 1295, a representative Parliament, with the significant words, "What touches all should be approved of all." This action estab-

lished the Parliamentary constitution of England.

Edward III (1312-1377), King of England from 1327 to 1377, son and successor of Edward II. He was chosen king by Parliament after his father had been forced to resign his position, and during his minority the management of affairs was practically in the hands of his mother, Queen Isabella, and Mortimer, Earl of March. In 1330, however, Edward had Mortimer executed and Isabella banished, while he himself assumed control of the kingdom. Among the important events of his reign were several invasions of Scotland and the declaration of war against France (See HUNDRED YEARS' WAR). Edward led his army to victory at Crécy and captured Calais, but failed to realize his ambitions to overcome Scotland and France. Among the laws passed during his reign were several attacking papal claims to religious taxes.

Edward VII (1841-1910), King of Great Britain and Ireland and Emperor of India. He was the eldest son of Queen Victoria and Prince Albert, and inherited the title Prince of Wales. After receiving his education at Oxford and Cambridge, he became colonel in the army in 1858, traveled in Italy and Spain in 1859, and made a tour of the United States and Canada in 1860, where he was most cordially received. Two years later, in company with Dean Stanley, he traveled through Egypt, Palestine and India. In 1863 he married Princess Alexandra, daughter of Christian IX of Denmark.

During Queen Victoria's reign Edward took little part in politics, but he devoted much attention to ceremonial and social functions, in which he often represented his mother. He was also a close student of world politics, and by frequent visits to the leading courts of Europe became personally acquainted with the reigning houses. This liberal training, together with his natural sagacity and diplomatic tact, made him an efficient and influential ruler both at home and in international affairs when he became king upon his mother's death in

1901. He was instrumental in negotiating several treaties, which changed the isolation of England into an attitude of friendly cooperation with other powers. Edward's influence in favor of international peace was so potent that it gained for him the title of "Peacemaker." His sudden death caused general mourning in England and among the nations.

Edwards, Amelia Blandford (1831-1892), an English novelist and Egyptologist, born in London. She began writing at an early age, traveled through Eurasia, Africa and America, and after making several expeditions to Egypt, lectured and wrote extensively on the antiquities of that country. She was secretary of the Egyptian Exploration Fund and translated Maspero's work on *Egyptian Archaeology*. Among her works are *A Thousand Miles Up the Nile*, *Untrodden Peaks and Unfrequented Valleys* and *Pharaohs, Fellahs and Explorers*. Her novels include *In the Days of My Youth*, *Hand and Glove*, *Lord Brackenbury* and *Barbara's History*.

Edwards, Jonathan (1703-1758), an American theologian, born in East Windsor, Conn. He graduated at Yale in 1720, where he was tutor from 1723 to 1726. The following year he became pastor at Northampton, Mass., and remained with this church until 1750. From 1751 to 1758 he preached to the Housatonic Indians at Stockbridge. In 1758 he accepted the presidency of Princeton College but died of smallpox a short time after his installation. There was a gentleness about his face and manner ever suggesting the scholar and the mystic; but he was dismissed from his position as a minister by a congregation that he had served for 23 years, because of the severity of his church discipline. In 1754 he published the *Freedom of the Will*, a masterpiece of metaphysical logic. Among many other writings, perhaps the most noted is that of *Original Sin*. Edwards was one of the greatest metaphysicians America has produced, and his teachings exercised a profound influence upon New England thinking. Through his revivals, and especially what is known

as the Great Awakening of 1739-40, he also strongly influenced the practical religious life of his time.

Edwardsville, Ill., a city and county seat of Madison Co., 23 m. n.e. of St. Louis, Mo., on Cahokia Creek and on the Toledo, St. Louis & Western, the Wabash, the Illinois Terminal and other railroads. The town is an important banking and railroad center. It is in the midst of an agricultural and a coal-mining district, and its manufactures include sanitary and plumbing supplies, tools, carriages and buggies, brass finishings, singletrees, plows and bricks. A public library is among the attractive features. Settled in 1812, Edwardsville was incorporated in 1819. Population in 1920, U. S. Census, 5,336.

Edwardsville, Pa., a city of Luzerne Co. near Wilkes-Barre, on the Lehigh Valley and other railroads. Coal mining and shipping is the chief industry, as the town is located in the anthracite region of the state. There are machine shops, lumber and planing mills, silk and hosiery mills and manufactories of miner's supplies, etc. Population in 1920, U. S. Census, 9,027.

Eel, a group of peculiar fishes, consisting of many families recognized by certain distinguishing traits. All eels may be known by the distinct separation of the skull and shoulder bones, the large number of similar vertebræ, which give the body a snakelike form, and the absence of a ventral or a separate dorsal fin. By many structural differences the eels are recognized as being a degenerate type of fish. The true eels have fine, scarcely distinguishable scales, pointed heads and long bodies. They are found in fresh waters from Newfoundland to Central America and in all the tributaries of the Mississippi. At spawning time they take to the salt water where the old eels die; the young may later be found in large numbers ascending the streams. Eels are exceedingly voracious and feed upon all kinds of fish or even upon dead animal matter. They are valuable food, however, and are caught in traps and eelpots. The true eels, snake eels, gulpers,

BIRDS' EGGS AND NESTS



1. NEST OF WOODPECKER
2. NEST OF ROBIN
3. NEST OF BALTIMORE ORIOLE
4. OSTRICH EGG
5. NEST OF RED-EYED VIREO
6. NEST OF BLUE-GRAY GNAT-CATCHER

8. EGG OF HOUSE WREN
9. EGG OF WOOD PEWEE
10. EGG OF KINGBIRD
11. EGG OF BOBOLINK
12. EGG OF RED-HEADED WOOD-PECKER
13. EGG OF CUCKOO
14. EGG OF SPOTTED SANDPIPER

15. EGG OF GAMBEL'S PARTRIDGE
16. EGG OF SPARROW HAWK
17. EGG OF SEMIPALMATED SANDPIPER
18. EGG OF LAUGHING GULL
19. EGG OF SCREECH OWL
20. EGG OF TERN

sand eels, conger eels and thread eels are members of different families, but all have somewhat the same structure and habits. Their color is generally brown but varies in the different families. See CONGER EEL.

Egeria, *E je' ri a*, a nymph of Aricia, in Italy, wife of Numa, second King of Rome, to whom she secretly taught jurisprudence. She mourned so over Numa's death that she melted into a fountain.

Eg'gleston, Edward (1837-1902), an American novelist and historian, born in Vevay, Ind. He entered the ministry in 1856, preached as a Methodist circuit rider and held pastorates in several cities in Minnesota. After doing editorial work on the *Little Corporal*, a publication for children, he edited successively the Chicago *Sunday School Teacher*, the New York *Independent* and *Hearth and Home*. From 1874 to 1879 he was pastor of a church in Brooklyn, and afterwards devoted all his time to literary work. As a historian he is best known by *The Household History of the United States*. His novels, however, represent his most characteristic work. *The Hoosier Schoolmaster* has remained a favorite. Other works are *The Circuit Rider*, *The Hoosier School Boy*, *The Faith Doctor*, *The End of the World* and *The Graysons*.

Eggleston, George Cary (1839-1911), an American editor and author, born in Vevay, Ind., brother of Edward Eggleston. After serving in the Confederate army in the Civil War he took up journalism, giving up his profession of law which he had previously entered. He was successively managing editor of *Hearth and Home*, literary editor of the New York *Evening Post*, editor of the *Commercial Advertiser* and editorial writer for *The World*. He edited Hayden's *Dictionary of Dates* and compiled *American War Ballads*. Among his works are *A Rebel's Recollections*, *Juggernaut*, *Southern Soldier Stories*, *The Last of the Flatboats*, *A Daughter of the South*, *Life in the Eighteenth Century*, *A Carolina Cavalier*, *Our First Century* and *Irene of the Mountains*.

Egg'plant", an East Indian plant of the Nightshade Family and so related to the potato. It is an erect vine, having prickly leaves, showy purple flowers and a globular fruit also purple in color. The shape of this fruit and the smooth hard rind have given the name to the plant and to its fruit. The vegetable is served in a variety of ways, but generally sliced, dipped in a batter and fried in butter. Eggplant is naturally a tropical fruit, but is raised in America as far north as southern Canada, where it is planted in hotbeds. The size and flavor of the fruit depend greatly upon the richness of the soil and climatic conditions.

Eggs, the oval reproductive bodies produced by birds, reptiles and many lower animals. Those of different species are very different in form and coloring, but, in general, all consist of a heavy yellow portion called the yolk in which lies the protoplasmic germ from which the individual develops; surrounding this is the albumen, or white, the food which nourishes the growing cell. To protect these, a tough but thin white membrane and a brittle, limy shell are provided. The eggs of lower animals often lack the shell and are found in great masses held together by a sticky substance which also serves to fasten them to a sheltered spot. Fish eggs are always of this kind, and together with the enveloping mass, are called spawn.

The eggs of birds are of general interest and by them the species of the bird may commonly be known. Nature wisely plans the differences in shape, for eggs that are laid in exposed situations are generally rounding at one end and pointed at the other, so that as the wind blows them they are turned in a circle and are not in danger of being rolled from the nest. The eggs that are more nearly spherical are found in well-protected spots. The color of eggs is quite a determining factor, and yet eggs of the same parents often vary greatly in shade and markings. The color of the shell is dependent upon a pigment, which may be deposited upon one or more layers of shell. Nearly everyone is familiar with

the green-blue, speckled eggs of the robin, the green-tinted, brown-spotted eggs of the meadowlark and the flesh-colored eggs of the woodpecker.

A full set of eggs may be from 1 to 20, but if the nest is robbed, many more than the ordinary number may be produced. This is commonly seen in the domestic fowl, whose long-continued laying supplies the market. Chapman tells of a high-hole, or flicker, whose nest was daily robbed of its egg and which in consequence produced 71 eggs in succession.

Incubation of the eggs is accomplished by heat generally supplied by the body of the female bird as she broods upon the nest. The temperature at which they must be kept varies; for the domestic fowl it is a constant temperature of 104° F. The time necessary for incubation is dependent upon the size of the egg; it varies from 12 days, among perching birds, to three weeks for the domestic fowl, and to from 40 to 50 days for the ostrich and the emu, which produce the largest-known eggs. The descriptions of the eggs of various birds may be found under the respective bird names.

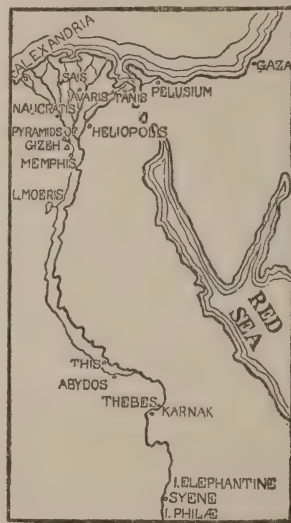
The eggs of the domestic fowl are among the important food products. There are 1,293,662,433 dozens produced in the United States annually. The eggs of turkeys, ducks and geese are higher in price and are seldom put upon the market. See SPAWN; POULTRY; NESTS OF BIRDS; BIRDS.

Eg'lantine. See SWEETBRIER.

E'gret, a bird of the Heron Family. The egret is from 36 to 41 inches in length and is snowy white. The long bill is yellowish, with a black tip, and the long legs are blackish. These birds nest in colonies or rookeries and build large nests, consisting of platforms of sticks, in trees or bushes in the vicinity of water. Three to five pale blue eggs are laid. This beautiful bird once ranged the southern part of the United States to Patagonia, migrating in summer as far north as Nova Scotia and Oregon, but at the present time it is found nesting only in a few isolated places.

The story of the persecution and threatened extinction of this bird is one of the most cruel of the many crimes which may be charged to man's cupidity and woman's vanity. During the breeding season the adult birds are adorned with many beautiful, white, slender feathers or plumes, which extend from the shoulder beyond the end of the tail. These are the famous "aigrettes" of the milliner, and are worn by the bird only during the nesting season, at which time whole colonies of these birds have been shot for the plumes, and the young birds in the nest have been left to die of hunger and exposure.

Egypt, E'gipt, a country in northeast Africa. In its limited sense it means the valley of the Nile; in its political sense—



LOWER EGYPT

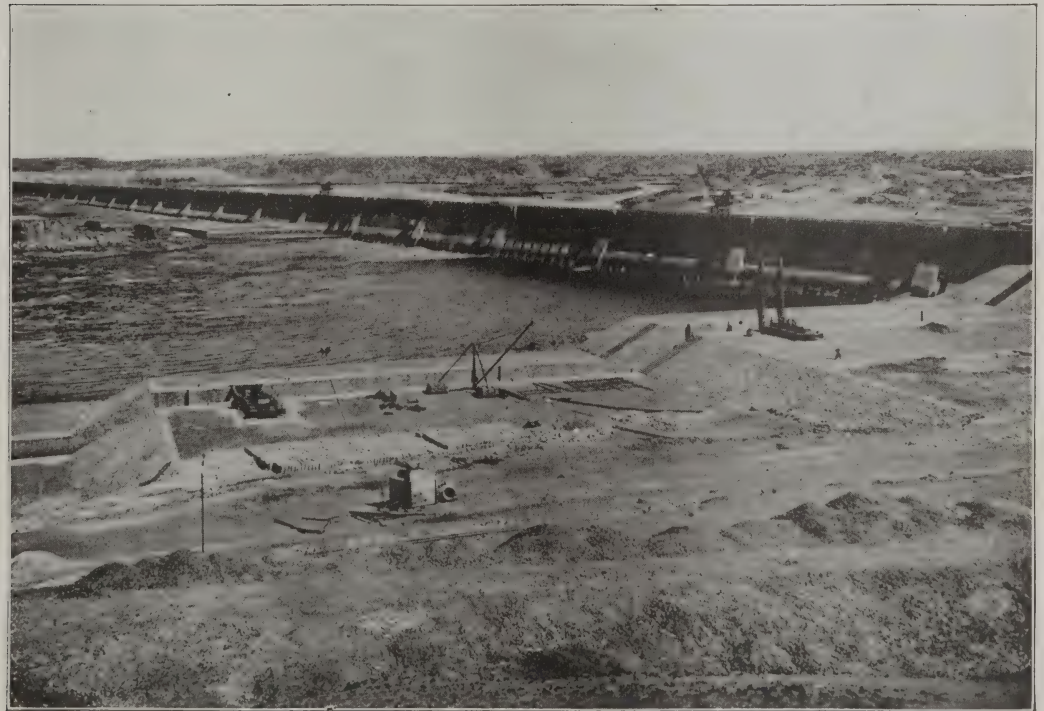
now a sovereign state—it includes also the Lybian Desert, the Isthmus of Suez and the Sudan. Its total area is about 400,000 sq. miles. The Valley of the Nile—the Egypt of history has an area of 12,000 sq. mi. The protectorate is bounded upon the n. by the Mediterranean Sea, on the e. by the Red Sea, Eritrea and Abyssinia; on the s. by British East Africa, and on the w. by Tripoli and the Great Desert. It will be noticed that the Suez Canal is constructed across British territory, and since this canal is an artery through which passes so much of the commerce of Europe and the far East possession of the Isthmus is of great importance to Great Britain.

PHYSICAL CHARACTERISTICS. Physically, and to a certain extent politically,

ANCIENT AND MODERN ENGINEERING IN EGYPT



GREAT PYRAMID, SPHINX AND RUINS OF A TEMPLE
Enduring monuments of an ancient civilization.



ASSUAN DAM

This structure has a water capacity sufficient to irrigate 6,000,000 acres.



AN EGYPTIAN PULLMAN

Egypt is divided into two great divisions, Lower Egypt, or Masr-el-Bahri, and Upper Egypt, or El Said. The former is mainly the delta of the Nile, a broad triangular plain, the apex of which lies but a short distance south of Cairo. The latter is a narrow but fertile valley about 600 m. long and but 10 m. wide. To the east and west of these stretch the sandy, almost waterless deserts. The Afro-Arabian Desert at the east rises by means of terraces to a broad plateau, which is bounded by the northern ranges of the Abyssinian Mountains. The Libyan Desert is a monotonous, gently rolling tract having many oases that are well known.

Egypt was called by the Greeks the "gift of the Nile," and the name is extremely apt. The most of its water is received from the highlands of Abyssinia, where the rainfall is greatest in the summer months. The last of June the river begins to rise and does not flow back into its channel until September or November. As the water settles, a fine layer of silt covers the plain, which is by this time thoroughly saturated; this affords the moisture for the remaining months, as in Egypt it seldom rains.

CLIMATE AND PRODUCTIONS. The skies of Egypt are practically unclouded, and the extreme dryness of the air makes the climate unusually healthful; for this reason Egypt is becoming a popular winter resort. At Alexandria the proximity of the sea renders the winter more mild and the summer less warm than at Cairo. In the upper valley and the desert region the heat is intense, although in winter the temperature sometimes falls below freezing.

Wherever irrigation is used, agriculture is a profitable pursuit. Two kinds of irrigation are practiced: in Upper Egypt the water is collected in great natural reservoirs and from them distributed during the dry months; in Lower Egypt the water is pumped from the river throughout the entire year. In this latter region crops requiring a long growing season may be raised. Rice, durra cotton, sugar cane, dates, maize

and wheat are the principal products. The recently-completed Assuan Dam makes irrigation possible over a far greater area than ever before (See IRRIGATION). Other products of Egypt not before mentioned are barley, corn, clover, beans, millet, figs, oranges and lemons. Wheat is raised on about one-half the cultivated area and is the chief crop. Cotton and cottonseed are the principal exports, and Egyptian cotton is in great demand because of its long fiber, especially prized for spinning.

Egypt has few mineral products. The granite rocks from which her temples and monoliths were made came from the region of Assuan; the Nubian sandstone for the structures at Thebes were quarried near Selseleh; and the Pyramids and the great structures of Cairo are constructed of nummulitic limestone.

ANCIENT EGYPT. Religion. The religion of the Egyptians, like that of all primitive peoples, was at first based upon the belief that they were surrounded by higher beings whom they must propitiate. These spirits were powerful for good or evil in every act of their lives, from the appointing of just judges to the warding off of disease. The Egyptians represented their gods under the forms of animals. In some places whole classes of animals were sacred. At Bubastis were cemeteries filled with the mummies of cats; in other places are found the buried mummies of crocodiles, lizards, ibises and other animals. One god, Khnum, lived in the body of a ram, and when the animal died the god left the body and passed to that of another ram. Likewise the bull, Apis, a black animal with certain white markings, was thought to contain the spirit of the god Ptah. Three divinities they unified into a family composed of Osiris and Isis and their son Horus.

Toward the end of the 18th dynasty, an attempt to unify these beliefs into the worship of one god, failed. Then the priests tried to give a more spiritual and intellectual interpretation to these accounts. Ra or Re, their chief god, who represented the sun, was not only

the creator of all things, but the first ruler of Egypt. Thus the Pharaohs, descended from Ra, were divine. Still later the stories of Osiris and the exploits of Ra were supposed to symbolize the eternal conflict between good and evil.

The soul was considered inseparable from the body. It hovered near the body after death and would one day return to it. For this reason they took the utmost care to preserve the body by embalming, and for this reason the kings reared the massive Pyramids, where their bodies might remain undisturbed until soul and body were again united. On the walls of the tombs were pictures representing the earthly occupations of the deceased, while articles of furniture and dress, such as jars, mirrors, chairs and even wigs, were placed within the burial chambers.

Science and Art. The Egyptians had some knowledge of astronomy. They used the decimal system in arithmetic. Of medicine and even of anatomy, their ideas were of the crudest. They developed a system of picture writing which was extensively used and which can still be easily traced on the temples and tombs. Many of the papyri found in coffins of rulers are also written in these characters, called hieroglyphics.

In architecture they sought for mass and magnitude rather than for beauty of line and proportion. The Pyramids and the enormous temples give proof of this. The statues were made from hard granite. The poses of the figures are seldom graceful or natural, and since they had no knowledge of perspective, the profiles and front views of their figures are strangely mixed. Their statues show, however, strength, realism and vigor. The Egyptians showed great skill in gem cutting; and they carved the lining of the sacred scarabæus (beetle) so delicately that it is believed magnifying glasses were used.

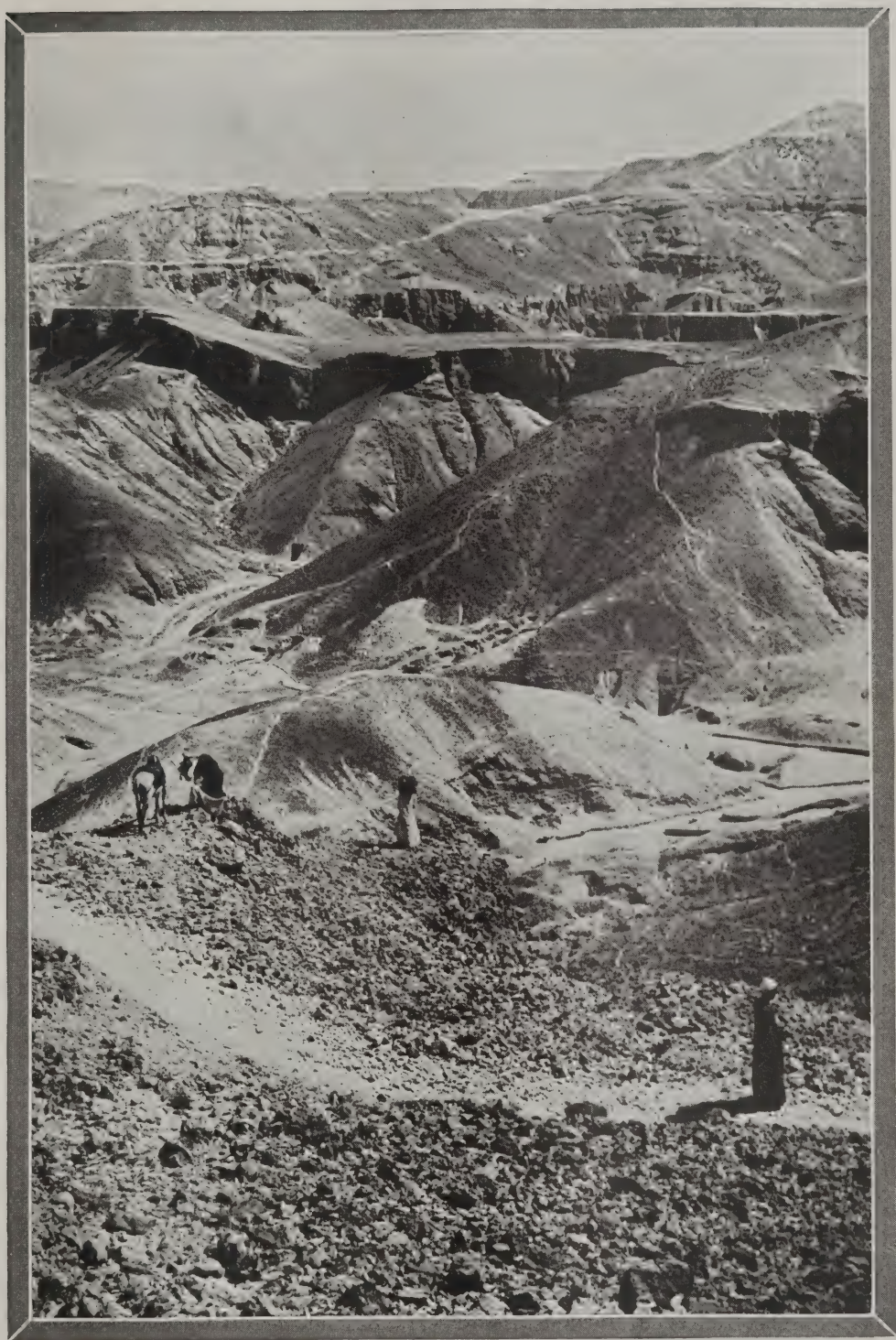
GOVERNMENT. Ancient Egypt presents us with an example of the very highest development of tribal society. The number of tribes of course varied. Each was

in possession of a definite extent of territory called a nome. During most of Egypt's extended history the tribes were confederated under the lead of some one of the more powerful and war like tribes. The changes of dynasties in Egyptian history refer to changes in the ruling tribe, another tribe assuming the hegemony. The strange gaps or lacunae in Egyptian history, of which several occur, were periods when the central power was completely broken down, and each tribe, or possibly small confederacies of tribes were independent in different sections. In periods of strongly centralized rule, the ruling pharaoh, or chief of the ruling tribe, appears in history as one of the great pharaohs of Egypt. His rule was despotic, but yet the chiefs of the nomes of Egypt always appear as a sort of royal council. These chiefs are often spoken of as nobles, but their real power and office was nothing more nor less than tribal chiefs in general.

The priesthood in ancient Egypt illustrates in a wonderful way the tendency of tribal priests to draw together as a separate body or caste. Other examples of this tendency are noted in the history of other ancient people. As in ancient, or tribal society, generally, there was no private ownership in land.

Literature. See LITERATURE, subhead *Egypt*.

HISTORY. Egypt was a highly civilized country, with a stable government as early as 5000 B.C. At that time, the tribe at Thenai was the ruling tribe and Memphis was their capital city. This period in Egyptian history is known as the Old Empire. The fourth Dynasty about 3800 B.C. is known as the Pyramid Building Dynasty. About the year 2800 the tribe at Thebes assumed the leadership. This period probably came to an end by reason of the Hyksos invasion and conquest, which constitutes one of the most mysterious periods of Egyptian history. The Hyksos were Semitic invaders from Southwestern Asia, and the seat of their power was in the Delta. They ruled Egypt for an unknown time, probably several centuries, but the



Valley of the Tombs of the Kings near Luxor, Egypt, showing the scene of many years of patient excavation work.

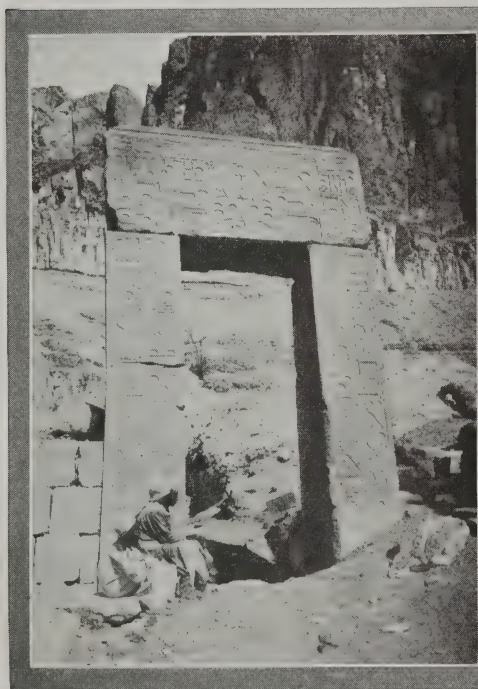


(Top)—Outside the tomb of Tut-Ankh-Amen. (Left Center)—Lord Carnarvon, his daughter, and Mr. Howard Carter. (Right Center)—Bringing out chair 3,400 years old. (Bottom)—The meal that was entombed with King Tut.



TEMPLE OF HORUS. (Vestibule).

Begun 237 B. C. by Ptolemy III and completed by Philopator in 212 B. C. Inscriptions show events in the lives of the gods.



DER EL-BAHRI

Granite gateway to upper terrace of Queen Hatsheput's mortuary temple (also XVIII Dynasty).



ABYDOS, TEMPLE OF SETI

Looking north of west between the second and third row of columns of the second hypostyle hall.



DENDERAH—TEMPLE OF HATHOR.

Built in first century B. C. Figures depict the Roman Emperors advancing with offerings for Hathor and other gods. The screen-walls between the columns are almost hidden by rubbish, thus greatly reducing the apparent height of the temple.



THE SILENT SPHINX.

Named for the sun-god Harmachis (Horus on the Horizon). Entire height 66 feet, length 187 feet, ear $4\frac{1}{2}$ feet, nose 5 feet 7 inches, mouth 7 feet 7 inches in length.

people, headed by the princes of Thebes, finally drove them from the country. This struggle lasted for half a century and developed a warlike spirit in the nation. The horse, introduced by the Hyksos into Egypt, changed the method of warfare; chariots were used and marches were longer. This warlike spirit flowered in the 18th dynasty (about 1600-1350 B. C.), and a series of strong kings conquered western Syria and extended the empire to the Tigris. The brilliant reign of Rameses II (about 1350) closed this period of military glory.

Period of Decline. In the 19th and 20th dynasties came a weakening of power, and by 1100 B. C. Egypt had lost all her possessions. About 1320 B. C. the Hebrews escaped from Egyptian bondage and established a new nation in Palestine. In 672 B. C. the country became subject to Assyria. Twenty years later Psammetichus, a native ruler, gained independence for Egypt. The soldier class, disgusted with him because he opened the country to foreigners, deserted and thus made easy the Persian conquest in 525 B. C. Egypt was never independent after this time. It was ruled by Persian satraps for two centuries, then came under Greek sway under Alexander. When he died, although it became a separate state, it was ruled by the Greek Ptolemies until Cleopatra, the last of the line, was overcome by Augustus Cæsar in 31 B. C.

Moslem Conquest. Egypt continued a Roman possession from this time until the fall of Rome, when Europe, busy with its own reorganization, forgot its African lands for the time. To the Mohammedan world it rose in importance until 641 A. D., when it was entered by the Arabs who gradually usurped the land and made the country a seat of Mohammedan power; Cairo became one of the great literary and religious centers. So great was its influence that the later Crusades were directed toward it rather than toward the Holy Land itself. Its history continued through a series of tumultuous dynasties until it again drew the attention of military Europe in 1798,

when Napoleon I defeated the Mamelukes, the professional soldiers of Egypt, not far from the Pyramids. His triumph was short, however, for barely three years elapsed before the French forces were in turn driven out by the Turks, who were aided by the British.

Recent History. Mehemet Ali, a Macedonian soldier of the Turkish army, so distinguished himself in the campaign against the French that he was appointed viceroy of Egypt by the Sultan of Turkey in 1805. His long reign of 44 years was a period of progress for Egypt. He reorganized the army, built fortresses and even extended his region of control until his Turkish sovereign feared the power of her ambitious subject and twice sent armies to subdue him, but each time was disastrously defeated. At last European powers intervened to force Mehemet to confine his power to African territory. This ruler was able and progressive; he is said to have driven robbers out of Egypt, constructed great public works and introduced the cultivation of cotton. His successors continued his policy of improvement. Ismail Pasha (1863-1879) first received the title of Kediye, and it was he who promoted the Suez Canal project. In 1880 a dual French and English control was established, but the arrangement was annulled in 1883, when the British assumed entire control. In 1914 when Turkey entered the World War, Great Britain made Egypt a protectorate, dismissed the Khedive and named his successor, Sultan of Egypt. In 1922, Great Britain relinquished the protectorate within certain limitations and Ahmed Fuah Pasha announced that Egypt enjoyed independence and sovereignty, and took unto himself the title of King of Egypt. Education is encouraged in both Mohammedan and nonreligious schools. The religion is chiefly Mohammedan. Cairo is the capital, and Alexandria, Damietta, Suez and Port Said are the principal cities. Population, 11,400,000.

Eider, I' der, Duck, a bird of the Duck and Goose Family. There are several species of eider ducks, of which the

common European eider is the best known. In the full breeding plumage the male is blackish beneath and white or creamy color above, with a patch of green on top of the head. The female and the young of the first and second year are reddish-brown with dark markings. This duck is somewhat larger than the domestic duck. The nesting site is usually near the coast where the nest is placed on a rock and is made of moss and seaweed. Five to seven light green eggs are laid.

The eider duck has a large quantity of soft down, which Nature has furnished as a protection against the severe cold of the regions the birds inhabit. When nesting, the female plucks the



EIDER DUCK

down from her breast to line the nest and cover the eggs. Since their down is one of the most valuable articles of commerce, the ducks are carefully protected by the inhabitants of the regions they frequent in Norway, Sweden and Iceland. The quantity of down secured is increased by removing the eggs from the nest. After the first laying the female furnishes a second lining of the nest, and after the second laying the lining is furnished by the male.

Eiffel, *Ef'fel*, Tower, an extensive and very high tower, named after Gustave Eiffel, its projector, and situated in the Champs de Mars in Paris, France. It was completed in 1889. It is 330 ft.

square at the base, and the support is four iron columns resting upon massive masonry. It is 984 ft. in height. Elevators carry people to the top and to the intervening platforms, 189 ft., 380 ft. and 906 ft. from the ground.

Einstein's Theory, propounded by Prof. Albert Einstein of Berlin, Germany. It successfully accounts for variations in the motions of the planet Mercury which cannot be explained by any other theory.

Its greatest triumph was in connection with the solar eclipse of May, 1919. According to this theory, light rays must be deflected by gravitation when passing near the sun and the amount of such deflection was calculated. But it is an amount twice as great as Newton's theory permits. Observation taken by astronomers confirmed Einstein's calculations in a most striking manner.

The reasoning on which the theory rests is of a most abstruse mathematical nature. Many of the conclusions do not apply to the world of time and space as we know it. Others affect the very foundation on which our physical sciences rest.

Some of the more startling conclusions are: The suppositional ether of space does not exist; Newton's theory of gravitation is overthrown. The size and shape of a body depends upon the velocity and direction of its movement. The three Newtonian laws of motion are questioned. Light consists of moving particles and possesses weight, sixteen tons of light bombard the earth every twenty-four hours. Space exists in four dimensions. Altogether it is the most startling revolutionary theory we have had since the beginning of present knowledge.

E'lastic'ity, that property of a body which causes it to recover more or less completely its original size or form when the outside forces that distorted the body have been removed. Bodies which show this property in a great degree are said to be elastic; those which show it in a small degree are considered inelastic. A body is said to be perfectly elastic if, when the distorting forces have been re-

moved, it promptly and completely recovers its original size or shape. Gases are perfectly elastic for large or small distortions. India rubber is perfectly elastic for very great distortions, but the force with which it resists distortion is not great. Tempered steel is perfectly elastic for small distortions, but the force with which it resists distortion is very great. In popular language the rubber is spoken of as the more elastic, having in mind the amount of distortion it will stand and still be able to recover its original condition. In scientific work the tempered steel is considered far more elastic, having in mind the force with which it resists distortion and tends to recover its original condition when the distorting force is lessened or removed. Hence tempered steel is used for watch and clock springs, carriage springs, spring balances, etc.

When a body has been so greatly distorted that it fails to recover when the distorting forces are removed, it is said to have been strained beyond the elastic limit. In all cases where the elasticity of a body is important, care must be taken to see that the body shall not be subjected to any force that will distort it beyond this limit. It is found by experiment that within the elastic limit the distortion produced is directly proportional to the force producing it and hence to the force tending to cause the body to resume its original size or shape. This law is known as Hooke's Law, after the Englishman Robert Hooke (1635-1703).

El'ba, a mountainous island in the Mediterranean. The Strait of Piombino separates it from the mainland, 6 m. distant. It is 18 m. long, from 3 to 10 m. wide and has an area of 86 sq. m. Mt. Capanne, 3350 ft. in height, is the loftiest summit of the mountain range. Little farming is carried on, but the mineral deposits, including iron, granite, marble, salt and iron ore, are very valuable. The wines and fruits are excellent, and the fishing for sardines and tunny is abundant, while sea-salt extraction is another important industry. Porto Ferrajo and Porto Longone are the two seaports.

Napoleon dwelt on this island during his first abdication, when he enjoyed full sovereignty over it, holding the title of Emperor. Population, about 24,300.

El'be, a river of Germany. It rises at the base of the Schneekoppe, a high summit of the Riesengebirge, a mountain range between Bohemia and Silesia, makes many windings south, west and northwest through Saxony, Brandenburg and Hanover, and falls into the North Sea at Cuxhaven. Its tributaries are the Eger, Moldau, Saale, Havel and Mulde; its total length is 725 m. and the estimated area of its basin is 56,500 sq. m. Its fisheries are significant and from Hamburg the traffic is important. The chief ports are Dresden, Torgau, Wittenberg, Magdeburg and Hamburg.

El'berton, Ga., a city and the county seat of Elbert Co., 34 m. n.e. of Athens, on the Southern, the Seaboard Air Line and other railroads. The city is surrounded by a productive cotton-growing region, and the leading industries are connected with this staple, and with the quarrying of granite. There are cotton and cottonseed-oil mills, a cotton compress and fertilizer factories. Other industrial plants are wagon and carriage works, harness factories and ironworks. Population in 1920, 6,475.

El'burz', a mountain range in northern Persia, overlooking the Caspian Sea. The average altitude is 5000 ft., and Demavend, the highest peak, rises to a height of 18,500 ft. The fertile valleys lying in the range support a luxuriant tropical vegetation, but the slopes suffer from deficient rainfall and are unfertile.

El Caney, El Ka na', Battle of, a battle of the Spanish-American War, fought at El Caney, a fortified town near Santiago, Cuba, July 1, 1898. Forty-five hundred Americans were commanded by General Lawton, and about 500 Spaniards were under General Vara del Rey. After a siege of almost a day the works were taken, each side losing some 400 men and most of the surviving Spaniards being taken prisoners. This was one of the few important land engagements of the war.

El'der, a slender, graceful shrub of the Honeysuckle Family, found commonly in the United States, drooping over roadside ditches, meadow brooks and rivers. The branches are long and bend with the weight of leaves and flowers; because their core is of soft white or yellowish-brown pith they are sought by children for making whistles and "popguns" and are said to have been used by Egyptians in ancient times to make a peculiar musical instrument called the sambuke, a name derived from the scientific name of the plant. The leaves are made up of fine, dull green leaflets with slightly notched margins. The flowers, which appear soon after the flowers of the orchards have fallen, are borne in large, flat-topped clusters, whose fragrance attracts the bees to their honey-filled cells. The individual flowers are white or yellowish-white, with five petals and five yellow stamens. The fruit is a stone fruit, but has three stones instead of one. Our commonest species has tiny blue-black berries, growing many in a cluster. In the Northern woods the red-berried elder is found on rocky slopes, bearing larger, bright red berries.

In England the elder is an accompaniment of cultivation and is always found near dwellings. In the Tyrol, it is said the peasants lift their hats to it in recognition of its usefulness. In the United States the fruit is used in making an elderberry wine, which has medicinal virtues, and in flavoring other drinks. A legend says that he who plants an elder in his yard shall die in his own home.

Elecampane, *El'e kam pane'*, a stately European weed of the Composite Family which has been naturalized in the United States and is common in all but the extreme southern and western parts. It grows sometimes to a height of six feet, and its strong stems bear large, pointed leaves whose veins are quite conspicuously marked. Underneath, the leaves are woolly and somewhat gray in tone; the lower ones have long stems but the upper are stemless and clasp the flower stalk. The flowers are showy heads of yellow florets surrounded by close-set,

sprawly rays. These lift their heads so joyously in the sunshine that children call the plant "Prince Elecampane." Its roots and stems are supposed to have medicinal value and that is probably the reason for its transference across the Atlantic.

Elec'toral College, in the United States a body of men who are chosen by the people of the several states to elect the president and vice-president. The number of electors chosen by each state is equal to the whole number of members that the state sends to both houses of Congress. No senator, representative or person holding an office of profit or trust under the United States can be chosen as an elector. The day on which electors are chosen must be the same in all states—the Tuesday next after the first Monday in November of every fourth year. The electors meet in their respective states on the second Monday in January after the November election and vote by ballot for the president and vice-president. No organization is required at this meeting, but it is customary to elect a chairman. They then make three lists of all persons, offices and number of votes and the names of the state electors; seal and certify each; transmit two to the president of the Senate, one by messenger and one by mail, and deposit the third with the Federal judge of the district. They have no further functions.

On the second Wednesday in February in the Hall of Representatives and in the presence of both houses of Congress assembled the president of the Senate opens and counts the votes and announces the result. In case of a tie the House of Representatives decides the vote for president by a majority of states, each state having one vote. In case of a tie in the vote for vice-president the Senate decides the vote, voting by member, not by states. If no candidate for president has a majority the House of Representatives proceeds to choose a president from the three highest candidates on the list. Each state has one vote and a majority of all the states is necessary to elect. If no candidate for vice-president has a ma-

majority the Senate proceeds to choose a vice-president from the two highest numbers on the list. Each senator has one vote and a majority of the whole number is necessary to elect.

Electoral Commission, a special commission appointed to settle the presidential election of 1876. The election was claimed to have been won by both Republicans and Democrats. Four states, Florida, Louisiana, Oregon and South Carolina, each sent two sets of different returns to Washington (See **ELECTORAL COLLEGE**), and each party in each of these states advanced strong arguments for the legality of its returns. The dispute arose over the proper election of the presidential electors. Without the votes of these states the Democratic candidate, Samuel J. Tilden, lacked only one vote of the majority necessary to elect. The Republican candidate, Rutherford B. Hayes, needed all the votes of these states to give him the majority. In order to settle the difficulty in as fair a manner as possible, Congress created an electoral commission of 15 members, consisting of five justices of the Supreme Court, five United States senators and five representatives in Congress; there were seven Democrats and eight Republicans. The commission was given full authority to settle the contests. By a vote of eight to seven, Hayes was given the vote of all the states in dispute. Although obliged to accept the result, the Democrats claimed that the election rightfully belonged to Tilden. This gave rise to the cry "Tilden elected, but Hayes counted in" that was current during Hayes's administration.

Elec'trical Fish, a name applied to a number of fish of various families which have the power of imparting an electric shock. This power seems to originate in organs made up of highly specialized cells located at different places in different species. In all the action seems to be wholly voluntary and easily exhausted; once gone, food and rest are necessary in order to restore it. The shock given may be communicated by any ordinary conductor and gives the same prickly sensation as a slight elec-

tric shock. The object of this peculiar power is to stun the prey of the fish or to terrify its enemies.

In the electric rays, or torpedoes, the electric apparatus consists of two sets of tiny hexagonal cells, about 400 in a set; these are located at the base of the pectoral fins. The electric catfish has its entire body covered with a gelatinous mass of electric cells. The stargazer bears its electrical apparatus just beneath the skin at the top of its head. The electric eel, found on the coasts of Brazil and Guiana, has a pair of electric organs upon the back of the tail and another pair upon the anal fin. This is the most powerful of electric fish, and it is able to stun large animals by means of its strong battery.

Elec'tric Battery, a series of cells for generating an electric current and so connected that they act as one. A single cell is a device whereby electricity is generated by chemical action. The first of these cells, or batteries, was developed in consequence of an experiment by Galvani (See **GALVANI, LUIGI**), and was improved by Volta. It is, therefore, called the galvanic, or voltaic, battery. It consists of a jar containing very dilute sulphuric acid and having partly immersed in it a strip of zinc and a strip of copper, which do not touch beneath the surface. If their upper extremities are connected by a wire or held in contact, an electric current flows from the copper, which is least oxidizable, to the zinc; this will continue to flow as long as the chemical action, and the consequent difference of potential, keep up. The galvanic battery may be made even more simply by merely wrapping a zinc rod in a blotter wet with dilute sulphuric acid and wound with a copper wire which connects with the zinc above the blotter. Although that which causes the electric current is the oxidizing of the zinc and copper plates, many other materials would give the same result. The zinc and copper plates are called the electrodes, the copper being the negative electrode and the zinc being the positive electrode; for the outside circuit, the copper is the positive pole;

the sulphuric acid is the electrolyte and the unbroken path through which the current passes is the circuit.

POLARIZATION. A galvanic, or voltaic, cell loses strength after the chemical action has continued for a short time, and investigation shows that the trouble comes about through the separation of the sulphuric acid; the hydrogen collects about the copper plate and the oxygen and sulphur unite with the zinc, forming zinc sulphate. All the time the hydrogen, which is more like the zinc in relation to the acid than the copper is, sets up a counter electromotive force in the opposite direction. This electromotive force, though smaller than the electromotive force of the cell, tends to weaken its effect and the cell is said to be polarized. The accumulation of the bubbles of hydrogen at the electrode also increases the resistance of the cell and hence weakens it still more.

KINDS OF BATTERIES. Many cells have been designed for the purpose of destroying or avoiding polarization. The most important of these are the Bunsen's battery, or cell, and the Daniell's battery.

Bunsen's Battery. This battery aims to avoid polarization by uniting the hydrogen and oxygen. Within the jar is placed a porous, unglazed cup through which electricity will flow, but the two acids, one outside and one in, cannot pass. Outside of the cup is the zinc plate in dilute sulphuric acid; within is a carbon plate in nitric acid. The hydrogen now collects about the carbon plate and is at once oxidized by the oxygen from the nitric acid. This cell is rather unpleasant to use because of the fumes of nitric acid, which are very penetrating. Bichromate of potash, an active oxidizer, may be used in place of the nitric acid, but the crystals which form upon the cups soon cause them to break; with this solution, however, the cups are not necessary. Such a cell is called a bichromate cell.

Daniell's Battery. This is the most commonly used cell. It also makes use of two liquids and a separating cup, but in this the zinc and sulphuric acid are

within the cup and copper in copper sulphate outside. The current set up through chemical action sets copper free from the copper sulphate and deposits it upon the copper plate; this, of course, will not cause any chemical action and for this reason this cell is the most constant in its electromotive force. The gravity cell is a kind of Daniell's cell in which the cup is not used, but the two liquids are kept separate by the force of gravity; the dilute sulphuric acid is kept afloat on the copper sulphate as oil would be on water. This cell is often used in telegraphy.

Dry Batteries. A dry battery is really dry only in comparison with those above described, in which liquids are used in quantity. The electrolyte in this case instead of being liquid is in the form of a damp paste. Such a battery usually has a rod of carbon in the center surrounded by the paste, while outside of this is a zinc cylinder which usually forms the outside of the cell. The paste usually consists of an ammonium chloride solution in which is mixed pulverized manganese dioxide and carbon, the dioxide being for the purpose of counteracting the polarization. The action is the same as that in one of the liquid cells. Dry batteries are used for operating doorbells, producing sparks in gas engines and for numerous other purposes where the current is used only intermittently. In practically all primary cells, such as those described, the source of energy is the conversion of the zinc electrode into zinc sulphate or some other compound of zinc. See STORAGE BATTERY; STANDARD CELL.

Electric Capacity. If various bodies are charged to the same electrical potential, it will be found that, in general, different quantities of electricity are required. The electrical capacity of a body, sometimes called its electrostatic capacity, is defined as that quantity of electricity which must be given to the body to increase its electrical potential by one unit. This is somewhat analogous to the capacity of a very elastic rubber balloon, which might be defined as the volume of gas in cubic inches that must

be pumped into it to increase the pressure by one unit, one pound per square inch.

The electric capacity of a conductor depends upon its size and shape, and the greater the size the greater the capacity. The capacity of a conductor, especially of a flat plate, can be enormously increased by bringing near it another conducting plate that is connected by a wire to the earth. Such a pair of plates constitutes a condenser, of which the Leyden jar is the most familiar example. The capacity of such a condenser is defined as the quantity of positive electricity that must be given the one plate to raise its potential one unit above that of the other plate, which is connected to the earth and which acquires by induction an equivalent negative charge of electricity.

The practical unit of capacity is the farad, and the microfarad, 1,000,000 times as small, is the unit commonly employed. A condenser is said to have a capacity of one microfarad if, when its plates are charged to a potential difference of one volt, one plate has a charge of one microcoulomb of positive electricity and the other an equivalent charge of negative electricity. See LEYDEN JAR.

Electric Clock, a clock driven or controlled by electricity or which controls other clocks by electricity. An electric battery and a small electric motor may be attached to a clock in such a manner that the current is switched onto the motor and the clock wound up every time the hands have moved a certain distance. This keeps the motive power of the clock constant and so contributes to regular running and good timekeeping. One centrally located clock, called a master clock, is often electrically connected with many other clocks, so that it corrects them to agree with itself every hour; or it may make a circuit every minute and step up each clock one minute at a time. In the latter case the many clocks do not run like independent clocks, but simply contain a mechanism by which the hands are moved when the master clock completes the electric circuit. See CLOCK.

Electric Condenser. See ELECTRIC CAPACITY; LEYDEN JAR.

Electric Converter. See MOTOR-GENERATOR.

Electric Current. When two parts of a conductor are at different electrical potentials, a movement of electricity takes place through the conductor tending to equalize these potentials. This movement of electricity through the conductor is called an electric current. In most experiments with so-called static electricity, such currents last for only an exceedingly short time until the potential has become the same at all parts of any one conductor; such momentary currents are not even constant in value while they do last. When a difference of potential between two parts of a conductor, as the two ends of a wire, is steadily maintained by a battery or by a direct-current dynamo or by other means, the electric current is a continuous one and its value is constant while it lasts. When the difference of potential between the two ends of the wire is regularly varied from a positive value to an equal negative value and back many times per second, the resulting current is called an alternating current, and the number of times per second that the potential conditions are repeated is called the frequency of the current. For ordinary lighting purposes an alternating current of a frequency of 60 cycles per second is usually employed; for power purposes, a frequency of 25 to 40 is more often used.

The practical unit in which electric current is measured is the ampere, an ampere being that current which will flow when a difference of potential of one volt is maintained at the two ends of a conductor whose resistance is one ohm. The international ampere is defined as that current which, when passed through a solution of silver nitrate in water, will deposit .001118 gram per second, the test to be carried out according to carefully prepared specifications. Currents are usually measured by means of their magnetic effects, using galvanometers and ammeters for the purpose. See ELECTRIC POTENTIAL; OHM'S LAW.

Electric Discharge. An insulated body that has been charged with electricity gradually loses its charge. If the body has sharp projecting points, the discharge is very rapid at the points, and is called *point discharge*. This point discharge is accompanied by a faint bluish glow, and when the difference of potential between the body and its surroundings is very great, the discharge consists of a large number of faint sparks or streamers forming a sort of brush that can readily be seen if the experiment be performed in a darkened room. This constitutes the so-called *brush discharge*. When the terminals of an electric machine that is operating are brought sufficiently near, a spark passes between them. This constitutes a *disruptive discharge*, and is like the discharge between the terminals of an induction coil, or the common streak lightning in a thunderstorm.

A violent disruptive discharge is usually a series of rapidly-oscillating single discharges, occurring so close together that the eye perceives the entire series as but a single discharge. Such a discharge is of the greatest importance in the production of the electromagnetic waves used in wireless telegraphy. When a discharge between two points takes place in a more or less perfect vacuum, the phenomena of vacuum tube discharges can be observed. And when the proper vacuum is used with suitable potential differences and terminals, cathode rays and X rays may be produced. See CATHODE RAYS; X RAY.

Electric Dy'namo. See DYNAMO.

Electric Generator, a machine for transforming mechanical energy into electrical energy. See DYNAMO.

Electric Heating. When an electric current is passed through a conductor having a high electrical resistance, the conductor is heated in proportion to the square of the current, the resistance of the conductor and the time the current lasts. The filament of an incandescent lamp is an example, and the fine-wire heating coil in electric flatirons is another example. When two pieces of iron

are brought into contact and a very heavy electrical current passed from one to the other, the poor contact between the two pieces offers a relatively high resistance, and the resulting heat developed is enough to melt very quickly the pieces of iron at the surface of contact. If, when the current has brought the surfaces to a welding heat, they are pressed tightly together and the current then turned off, the pieces of iron will be found firmly welded together. The advantages of this method are that the pieces to be welded do not have to be put into a fire and heated for a considerable distance from the point of the weld, and the process is an exceedingly quick and easy one to apply in many cases. For welding together the ends of two quarter-inch iron rods, an alternating current of about 400 amperes at a pressure of two or three volts is sufficient to give results in a few seconds. For securing such enormous currents at low voltages, special welding transformers are used. See TRANSFORMER.

Electricity, *E lek tris' i ty*. It is but a few years since the average person's entire acquaintance with electricity was based on a few disconnected and showy experiments, whose object was the production of sparks or of slight shocks that were seemingly the result of magic. The number of its uses has increased so rapidly that today everyone is familiar with some of the ways in which electricity is made to serve us, but there is still a question as to how it does the work. How does electricity run our cars, light our houses, lift our elevators and ring our bells? The nature of electricity is still unknown, but its way of working is easily understood and it can be depended upon to accomplish certain results under certain conditions. The present theory of electricity, which will be discussed later, has been formed in accordance with these results.

SIMPLE EXPERIMENTS. If you rub your fountain pen briskly upon your coat sleeve and then bring it near some finely torn scraps of paper, the papers will be attracted to the pen in a way that they

would not have been before the pen was rubbed. Glass rods rubbed with silk and sealing wax with flannel act in the same way. If you drag your feet across a woolen carpet and then touch the metallic fixtures in the room or the hand of a person, an electric spark may be seen to leap across and a slight shock may be felt. As far as these experiments go, the electricity generated seems all of one kind. A little further experimenting will show that there are differences in kind.

If two glass rods are suspended and then rubbed with the silk, they will be seen to swing away from each other; two rods of sealing wax rubbed with flannel act the same. A glass rod and the sealing wax, however, attract each other. This action is explained by saying that the glass rod contains positive electricity and the sealing wax negative. These names have no special significance and are given only to distinguish between the two kinds. Each kind repels its like but attracts its opposite. Every substance is supposed to contain both kinds, and by proper means the two kinds can be separated, but we do not see more manifestations of electricity because it is conducted away by some unobserved path.

To explain the action of the sealing wax and the glass, imagine that each rod contains an amount of positive electricity equal to its amount of negative electricity. When the glass is rubbed by the silk, the two substances have exchanged a part of their electricity in such a manner that the glass has now more positive than negative electricity, while the reverse has happened to the silk. In the same manner the sealing wax and the flannel have made an exchange, the wax containing more of the negative and the flannel more of the positive. Thus when the glass and the wax are brought near together, the two kinds of electricity strive so forcibly to meet that the rods are attracted to each other. Were the silk and flannel properly insulated, that is, kept from losing their charges, they also would attract each other. As men became thoroughly interested in watching and studying the actions of electricity,

they invented machines to do this rubbing for them and better opportunity was offered for finding what electricity would do. See **ELECTRIC MACHINE**.

OLD THEORIES OF ELECTRICITY. To understand the way in which electricity became one of man's assistants it may be well to go back to some of the first theories concerning it. Probably the first experiment ever performed was one similar to those described above. An old Grecian philosopher rubbed a stick of amber and commented upon the result. He thought he had discovered a property of amber and from that time on amber was considered a peculiar substance having remarkable or even magic powers. No one thought of trying other substances in that way until centuries later when an English physician of Elizabeth's time found that glass and many other things acted in the same manner. To commemorate the old philosopher's experiment, however, he called this property, which he found so common, electricity from the Greek word *elektron*, meaning amber.

The next great step forward came in the time of Galvani (See **GALVANI**, **LUIGI**), who noticed a peculiar action in the leg of a frog with which he had been experimenting and which he had hung against an iron grating by means of a copper hook. He explained the action by saying that electricity was manufactured by the brain and carried throughout the body by means of the nerves. This theory was disputed by a contemporary scientist, Volta, who claimed that the electricity was due to chemical action, and to prove his theory used what is now known as the Voltaic pile. He alternated plates of copper and zinc, separating them by means of cloths drenched with sulphuric acid; then he connected the upper and lower plates by means of wires. When the wires were brought near together, a spark leaped across. This electricity seemed so different from that produced in the amber that it was called voltaic electricity, while the other was known as frictional electricity. It was so difficult to keep moist the cloths between the plates that a better plan had

to be found, and the voltaic battery was the result. See **ELECTRIC BATTERY**.

The last great epoch in the history of electricity began with the discovery by Michael Faraday in 1838 that if a coil of wire was brought quickly into the field of a magnet an electric current was set up in the coil; this current was only temporary but was induced again when the coil was removed from the field. He reasoned that to continue the current, the coil must be continually entering and leaving the field, the very principle upon which the modern dynamo is based. See **DYNAMO**.

HOW ELECTRICITY DOES ITS WORK. It took many years after Faraday's discovery to apply electricity to practical things. The dynamo and the electric motor were the result of years of study and thought and experiment. It was known that a complete circuit was necessary for the electricity to manifest itself, and the question was, how to lead the current away to where it would do the work required. It was also noticed that as the coil entered and left the magnetic field the directions of the current were opposite, thus producing what is known as an alternating current. In all modern dynamos, many coils of insulated wire are revolved in the field produced by large electromagnets. The currents generated in the coils are collected by commutators or collector rings and led away to distant places by insulated wires. There the current may be used for any desired purpose, such as lighting or running motors. The revolution of the coils is accomplished by means of engines, or turbines. Here lies the energy from which the electricity is generated; in the motor the electricity is again transformed into the energy which drives cars and runs elevators. It is necessary that a continuous metallic circuit be provided by means of which the current may travel to the motor.

THE PRESENT THEORY OF ELECTRICITY. Our modern conception of electricity only puts our question as to what electricity is into a different form, for if we say that the elemental charge of negative

electricity is a strain center in the ether we must ask what ether is, and can only reply that it is an invisible immaterial something that fills all space. If we imagine an exceedingly small portion of this ether being a strain center, we have in mind what modern scientists call a unit of negative electricity or a negative electron. As this unit moves, it possesses inertia, like matter, and the entire unit of electricity with its real or apparent mass is spoken of as an electron, or corpuscle. So infinitely small are these electrons that we cannot see them and yet they strike a metal in a vacuum tube with such energy as to heat it red hot. Negative electricity consists of these electrons, which seem to be capable of separation from ordinary matter. As to the nature of positive electricity, we are more uncertain, but it seems that, unlike negative electricity, it can never exist without matter (See **ELECTRON**). A good illustration of the way electrons travel has been given by Professor Gibson. He likens the circuit to a group of children standing in a circle passing pennies around a ring; if the circle is broken the passing must cease or the pennies may be dropped to the ground. This analogy must not be carried too far and is given only in illustration of one phase of electrical phenomena. Chemical affinity is now explained as being merely a manifestation of electrical attraction (See **AFFINITY**). Several popular books on the subject of electricity are now in print and furnish helpful reading to those who desire untechnical works. Consult: Hibbert, *Popular Electricity*; Gibson, *Electricity of Today*; Aylmer-Small, *Elementary Electricity Up-to-Date*; Sir Oliver J. Lodge, *Electrons or the Nature and Properties of Negative Electricity*; and *Modern Views of Electricity*.

Electricity, Use in the Arts. Many of the uses to which electricity has been applied in manufacture and commerce have come about through its power to separate chemical substances into their elements, a process known as electrolysis (See **ELECTROLYSIS**). The application of electricity to the arts then is prac-

tically a department of electrochemistry, although a few of its uses do not come under that head. Omitting the familiar applications of electricity in running electric cars, in making possible the telegraph, the telephone and electric elevators and automobiles, there remain many less well-known uses. Among those longest known are the inventions concerned with electroplating and electrotyping (See **ELECTROPLATING**). Similar to these in process are: the extraction of aluminum from its ores, a process now wholly carried on by electricity (See **ALUMINUM**); the removal of tin from scraps of tinned iron; the separation of gold from "tailings," or the refuse from stamp mills; the purification of sewage; the tanning of leather; the refining of copper; some methods of bleaching and dyeing; and the manufacture of alcohol. In Norway recently a process has been found for extracting nitrogen from the air for the manufacture of nitric acid, which is proving to be highly successful.

Railroad signals, together known as the block system and operated by electricity, have averted innumerable catastrophes. More scientific in their use are the electric instruments for registering the time of certain phenomena, such as earthquakes, and the scientific appliances which record the velocity and direction of the wind. In somewhat more practical use are the electric drills, electric hammers and numerous tools whose great strength and precision of work are governed by a simply operated switch. In France trees are being felled by electricity by burning through them with fine wires; this process is rapid and clean, leaving no sawdust in its wake. Recent attempts have been made with varying success to improve the quality of soils by electrification, and some seeds are found to germinate more quickly under the influence of a slight electric current. Among the novel uses of electricity proposed, one stands out as likely to be especially appealing to many sufferers. This is an electric couch to be used on shipboard or train, which is claimed absolutely to prevent seasickness.

Electricity, Uses in Medicine. Ever since the discovery of the Leyden jar attempts have been made to make use of electricity in curing disease and relieving pain, but only recently has it been known to be really of service in this respect. It was probably first used for massaging, and in this manner relieved muscular difficulties and counteracted the effects of nervous or mental ills, insomnia, hysteria, etc. Later it was found that the muscular contraction caused by the passage of the electric current had a curative effect upon various tissues of the body, and to a greater or less extent rheumatism, paralysis, neuralgia, neuritis, locomotor ataxia and goiter are treated by its use. In cauterizing wounds, removing diseased growths and checking the spread of ulcers it has proved valuable. Surgeons of the nose and throat make use of a fine electrically-connected wire which may be introduced into the nose or throat while the current is turned off; as soon as the wire is in contact with the diseased tissue, which has first been rendered deadened to pain, the current is turned on and the growth is thus easily and quickly removed by heating.

Very recently electricity has been used as an anæsthetic, either general or local, with great success. As the nature of electricity is better understood its uses will, no doubt, be increased and its value in medicine and surgery be greatly extended.

Electricity, Uses in the Home. A great lessening of the expense in producing and conducting electricity has increased to a large extent the number of uses to which it is applied. Aside from the many ways in which it is used for commercial purposes, many conveniences and comforts in the home are due to its use. Electric bells and telephones have been familiar too long to require more than mere mention, and electric fans and flatirons are becoming almost as familiar. The electric plate, which is for use on breakfast tables and tea tables, is far cleaner and more convenient than the alcohol-heated chafing dish formerly so popular. These plates are arranged as

toasters or for heating water, making tea and coffee, or preparing other simple dishes at the table. In some cases the coffee pots and teapots are themselves electrically connected.

A great convenience, almost a luxury, in a home is an electric heating plant, which does away with shoveling coal and preparing kindling. After the switch is turned the heat is soon felt. The cleanliness and the quickness with which heat is secured makes this method of heating most satisfactory, especially since, although the expense is far greater than for gas, the waste is less. Electric radiators which also give a soft, diffused light are, upon cold winter evenings, as pleasing to the eye as they are comforting to the body.

Among other electric inventions coming into use in the home are: burglar alarms, which operate by establishing an electric current that rings a bell as soon as a door or window is opened; buzzers, acting like electric bells and which not only serve to summon a maid but also to indicate from what room the summons comes; automatic thermometers or thermostats, which shut off the switch of the electric radiators, or control the heat supply in other systems, when the room reaches a certain temperature; automatic fire alarms on the same principle, which call the fire department when the temperature of a room reaches the danger point; automatic clocks, which never need winding and which keep accurate time because they are electrically connected with a regulator outside; curling tongs, heated like the irons by means of a wire coil within them; electric brushes and combs, which are especially convenient for drying the hair after a shampoo; and electric bed warmers that are often of medical value as well as of great convenience. All of these are of comparatively recent invention and are only a few among the many things which have gone toward rendering modern homes more comfortable. On farms where water power is convenient, dynamos are frequently installed, and the power generated is used in electric motors for run-

ning churns, sawing wood, cutting fodder and for other work of like character where gasoline engines were formerly used. If the power is sufficient, electric lights may be placed in house and barns.

Electric-Light Bug, or Giant Water Bug, a large insect of the Water Bug Family in the order Hemiptera. Although this giant among bugs is best known as it circles with awkward, whirling dives and snapping of wings in the zone of light about the arc lights of streets, the greater part of its life is spent under water. The eggs are deposited in the bottoms of ponds and hatch into huge, slowly-moving bugs with heavy, flattened legs, which are used as oars, and slender curved ones, which seem ever ready for their prey. In the sultry evenings of midsummer the immature water bug suddenly comes to the surface, loses its enveloping skin and becomes the better-known electric-light bug for a brief season. Struggling upon the walk after a heavy fall, it may be seen to have a gray-brown, flattened body, two or three inches in length, a short beak and short, thick forelegs. Electric-light bugs in the adult stage are annoying but harmless; as water bugs they destroy many small fish and other less missed aquatic animals.

Electric Lighting. Familiar as we are at present with well-lighted homes and streets, it seems strange to read that in 1785, during a festival in Paris, Louis XVI was severely criticized for his extravagance in making use of sufficient candles to light his halls to the extent of two-tenths of a candle power for every cubic meter. In comparison with that, our streets at present are considered dimly lighted unless the light amounts to from one to two candle power per cubic meter. The use of electric lights is, no doubt, greatly responsible for this change, and yet their introduction is so recent that stories of attempts to "blow out the light" are still common.

Without the electric dynamo the use of electricity for lighting would have been impossible, for, though the brilliancy of the electric spark had early been

noticed, no way was known of rendering it permanent or of producing a steady powerful current. To understand fully electric lighting, the dynamo and something of the nature of electricity should be known. See DYNAMO; ELECTRICITY.

ELECTRIC LAMPS. There are three main classes of lamps now in use—arc lamps, glow lamps and vapor lamps. The first of these are commonly seen on streets, in public halls, stores, etc.; the second, in homes; and the third, although showing great possibilities, are not in common use.

Arc Lamps. These were the first used electric lights and are the result of experiments by Sir Humphry Davy. They depend upon the principle that if an electric circuit be broken and each end of the wire be connected with a stick of carbon, when the two are brought together and the current turned on, the current leaps the break in the circuit as the carbons are separated, so that an arc of light results. The ends of the carbon sticks offer so great resistance to the passage of the current that they are heated to white heat and give a powerful light. In the first arc lamps the carbon sticks were burned away so rapidly that the distance became too great for the current to leap, and even after this was remedied by a clockwork arrangement, which held them at the same distance, the carbons burned out in a few hours. At present the carbons are manufactured from a paste of powdered carbon molded by hydraulic pressure and heated to white heat. The control of the distance between the two is now governed by means of electromagnets. It is noticeable that with a direct current the positive carbon wears away more rapidly than the negative and assumes a concave form at the end, while the negative becomes pointed. This is because particles of carbon are continually passing with the current from the positive to the negative pole. From 80 to 85 per cent of the light given out comes from the positive carbon, and very largely from the hollow crater in the end. In an alternating current, which passes first in one di-

rection and then in the other, the carbons are both worn to rounded ends. The light emitted in this case comes equally from the two carbons.

The frame containing the carbons in the present arc light is partly enclosed in a glass globe which softens the light and does away with some of the burning of the carbon. Arc lights should be practically noiseless and steady; if a hissing sound is produced the carbons are too close together; if they flash and sputter, the carbons are too widely separated. The light given by an arc lamp is very powerful, and it is said that if large enough carbons were made, a light could be produced visible to Mars. Even now the light is the nearest to that of the sun of most of our artificial lights, and pictures taken by arc light are not to be distinguished from those taken by daylight.

Incandescent, or Glow, Lights. These are of several kinds: the carbon filament, the tungsten, or Mazda, the tantalum and the Nernst. All of these depend upon the principle that any substance which offers great resistance to the passage of the electric current is thereby rendered luminous, but must usually be confined where there is no air, so that it will not "burn up."

The most commonly used of these lamps is that which makes use of the carbon filament. The filament has been prepared by soaking cotton fiber in chloride of zinc and then forcing it through a tube having a fine bore. From the tube it passes into an alcohol bath, which renders it tough and of about the texture of catgut. When it has sufficiently set, it is heated in an atmosphere containing some benzine vapor that forms a coating of carbon to even any irregularities of the thread; it is then wound in the form in which it is to be finally left. When it is sealed into the globes, the ends of the filaments are terminated by platinum wires, which extend through the glass and expand the same as glass and thus do not allow air to enter the vacuum of the globe. The switch above the globe connects and breaks the circuit, thus turn-

ing on and off the current. Platinum, which has high resistance and so gives a bright light when heated by a current, was first used in place of the carbon filament, but as these wires were quickly burned out, a longer-lived and cheaper conductor had to be supplied. Each lamp is separately tested to see if the vacuum is complete and then to find if it can stand the necessary current. If the lamp stands these tests, it is ready to be capped and put upon the market. An average of 30 out of every 100 lamps are thrown aside in these tests or else sold at a much reduced price. Since, however, these cheap lamps burn out quickly, in purchasing globes the more expensive ones are ordinarily the more economical.

The tantalum and tungsten lamps have their filaments made from the once rare elements whose names they bear, and are rapidly becoming popular because only about one-half the current used in carbon filament lamps is required in these lamps to furnish the same candle power. The recent discovery of a large tungsten bed in Colorado is making tungsten lamps more popular in price and consequently more common. The tungsten lamp may be recognized by its straight, vertical filament; the tantalum light has a finer filament arranged in zigzag lines to increase the length of the glowing section. The tungsten lamp has the greatest efficiency and is at present superseding the others. The Nernst lamp has been used to some extent because of its soft yet bright light. It consists of a normally nonconducting filament of magnesium oxide or similar substance in a globe from which the air has not been removed; when the filament has been heated for a few seconds by a special heating coil, it becomes a conductor, and the current is automatically switched to the filament, which then diffuses a pleasing white light.

The vapor lamp consists of a long vacuum tube, with a mercury bath at each end into which are sealed the ends of the wires. As the discharge passes through, a part of the mercury is vaporized and becomes luminous. The light

given off is powerful but peculiar because it lacks the red rays; on this account it is said to have a quieting effect and, after one becomes used to it, to be a pleasing light. It is especially useful for photographic work but cannot be used where colors are to be selected.

The flaming arc lamp is an enclosed arc lamp in which are used specially prepared carbons or electrodes of other materials. In some, a rod of magnetite is used as the negative electrode; the strongly heated vapor from the magnetite is very luminous, giving off a far greater amount of light than does the carbon vapor between the carbons of the ordinary arc light. In other cases, carbons are used impregnated with the salt of some metal, the heated vapor from which is intensely luminous.

WIRING. The wiring for electric lighting is now a comparatively simple task. Care must be taken that wires do not cross and so form a short-circuit, and that the wires are sufficiently insulated. There are four methods commonly practiced: open, or exposed, wiring; molding wiring; concealed knob and tube wiring; and interior-conduit and armored-cable wiring. Their names suggest the differences in their construction. Electrically, the problem is to arrange the wires and the lamps on each subdivision of the system so that all lamps shall receive current as nearly as possible at the same potential and that this potential shall be the one for which the lamps are designed. Where alternating current is used, the current is conducted from the generating plant to the various houses at a high potential and by comparatively small wires. Just outside the houses it is transformed down to a much larger current at a lower potential and there distributed through the house by comparatively heavy wires. See TRANSFORMER.

EFFICIENCY. In all forms of electric light, even in the best, a comparatively small portion of the energy supplied to the lamp is given off as light; the rest is given off as heat merely and is wasted so far as the purpose intended is concerned. In a good carbon filament lamp,

from four per cent to eight per cent of the energy supplied is converted into light. In practice, it is more common to state the efficiency in terms of the watts of electricity supplied per candle power of light produced. In a carbon filament, this is from three to four watts per candle power; in the Nernst and tantalum lamps about two watts per candle power; in the tungsten lamps, about one watt per candle power. In arc lamps it varies from two watts per candle power in the older open types to one-fourth watt per candle power in some of the flaming arc lamps.

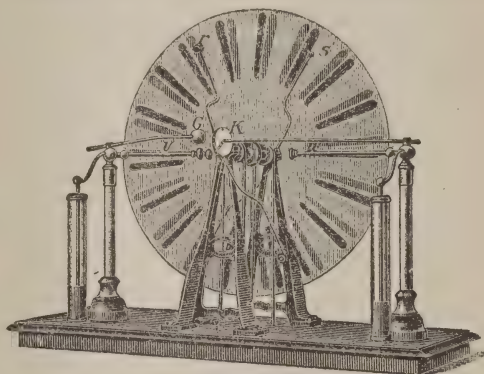
ADVANTAGES. Electric lights are pleasant and powerful, and, because they are so easily turned off and on, very convenient. In dwelling houses and similar places where incandescent, or glow, lamps are used, they are especially hygienic, since there is no burning to consume the oxygen of the room and leave injurious products of combustion in the air. Moreover, electric lights can be used with safety in many places where any other light would be dangerous or could not be made to burn.

Electric Locomotive. See LOCOMOTIVE, ELECTRIC.

Electric Machine, a device for generating electricity. The different machines belong to one of two classes: frictional machines and induction machines. In the first, electricity is produced by rubbing two dissimilar objects; a simple frictional machine is made when you rub a fountain pen upon your coat sleeve or a glass rod with silk. Induction machines are used to generate other charges by induction. See ELECTRICITY.

The first frictional machine consisted of a circular glass plate hung in such a manner that as it was revolved it rubbed against a specially prepared surface. The charge was collected by means of conductors and from them could be taken for any purpose desired. This machine, however, had slight efficiency and is now little used. The simplest of the induction devices is the electrophorus (See ELECTROPHORUS). Other devices in the form of machines are known by the

names of their inventors and are used in laboratories for studying electricity. The most familiar are the Holtz machine and the Wimshurst machine, both of which act as an arrangement of electrophori; and by this a small charge, first received by induction, is added to by the revolution of the machine. The Holtz machine is slow in starting and does not act well in moist atmosphere; otherwise it is the most satisfactory electric machine in use. The Wimshurst machine is the simpler of the two and is



WIMSHURST ELECTRIC MACHINE

the one more commonly used at the present time. Detailed explanations of these machines may be found in any text on physics.

Electric Me'ter, an instrument for measuring the strength of an electric current or the pressure (properly called potential difference or electromotive force) at which it is delivered. Those for the first purpose are called amperemeters, or ammeters; those for the second, voltmeters. The better instruments for commercial use in direct-current work are essentially D'Arsonval galvanometers (See GALVANOMETER). Their difference in construction is here given. The total current to be measured is sent through the ammeter, a very small fraction of which passes through the moving coil of the instrument, while the rest passes through a short wire inside the instrument and connecting one terminal to the other. The scale of the ammeter is marked to show the value of the total current pass-

ing through the instrument to produce the deflection indicated. The ammeter is accordingly a low-resistance instrument. In the voltmeter a very high resistance inside the instrument is connected in series with the moving coil so that only a very small current can pass through the instrument. The scale is marked with the value of the potential difference that must be applied to the terminals to produce the deflection indicated. The voltmeter is accordingly a high-resistance instrument.

The *wattmeter* is an instrument for measuring the power delivered to an electric circuit and is usually some form of electro-dynamometer (See ELECTRODYNAMOMETER). The fixed coil is made of heavy wire and is connected as an ammeter to the circuit; the movable coil is made of fine wire and has a high resistance joined in series with it, and it is connected as a voltmeter to the circuit. The scale can be marked to indicate the power in watts, being delivered to the circuit to which the meter is connected. Such an instrument will measure power in either direct-current or alternating-current circuits.

The more common meter, properly called an *integrating wattmeter*, or a watt-hour meter, is used in houses and elsewhere for measuring the electrical energy used, and it registers the product of power and time. It is really a small motor which runs at a speed proportional to the power being delivered. For direct-current work, the field coils of the little motor are made of coarse wire without an iron core and are connected to the circuit as an ammeter. The armature coils are made of fine wire without an iron core, have a high resistance joined in series and are connected to the circuit as a voltmeter. A copper disk attached to the armature shaft rotates between the poles of a permanent steel magnet and thus furnishes a retarding force proportional to the speed of running; hence the speed at which the motor runs is proportional to the power being supplied to the circuit. The total number of revolutions recorded in a given

time is, therefore, proportional to the product of the power by the time it has been supplied and accordingly measures the energy delivered in that time. The scale is usually marked in terms of watt-hours, a watt-hour being the energy furnished by a direct current of one ampere at a pressure of one volt flowing for one hour.

In the earlier days of the electrical industry it was common to use only a recording ammeter and charge according to the product of current and time, that is, the quantity of electricity delivered. In such cases, if the pressure fell, the meter still showed the same current in spite of the smaller energy delivered. A meter originally used in this way and still in use for some purposes acts much like an electroplating device (See ELECTROPLATING). The deposited metal, mercury, instead of clinging to the plates, drops into a cup and the amount collected shows the total energy used in the time on the assumption that the pressure has been up to the standard all the time. Such meters were cumbersome and not easily made accurate or easily read; hence they have been superseded for general use by various forms of watt-hour meters. "Penny-in-the-slot" meters, which are used much like the nickel telephone, are a recent invention. A coin deposited in the slot of the meter switches on a current which acts until the meter has registered an equivalent value of electrical energy, when the current is automatically switched off.

Electric Mo'tor, a machine for driving machinery by electricity. Its use is the opposite of that of the dynamo, for its object is to change electrical energy into mechanical energy, while the object of the dynamo is to transform mechanical energy into electrical energy (See DYNAMO). In general, the dynamo becomes a motor by sending the current through it in an opposite direction and from an external source.

The necessary parts of the bipolar direct-current motor are the armature, the field magnets and the commutator. An electric current from some external

source induces magnetism in the armature and also excites the magnetic field. The armature core is magnetized so that the line of its poles is in a direction at right angles to the magnetic field produced by the field magnets. It accordingly tries to set itself so that these poles will be in line with this field. But as soon as it has turned a little way, the connections to the windings of the armature are automatically shifted by the commutator segments moving under the brushes, so that the polarity of the armature is shifted back to its original position and the armature again tries to turn its poles into line. Thus the turning of the armature continues at uniform speed as long as the current is unchanged. In starting such a motor, a resistance or starting box must be connected in series with the armature and gradually cut out as the motor speeds up; otherwise an excessive current will flow and the armature is apt to be burned out.

Motors are generally of smaller size than dynamos, and the two, though theoretically interchangeable, are practically so for direct-current machines alone, and for some types of the alternating-current machines. Electric motors are chiefly of value because they furnish a simple means of using electrical energy at a distance from its source. They make it possible for water power to be utilized in running factories, and operating electric railways many miles from the stream. Several electric motors may be supplied from one large dynamo, and in factories they may be located at intervals and so largely do away with awkward and power-wasting belts, pulleys and shafting. Many machines are now made with an electric motor built as a part of the machine, thus doing away still further with friction, and economizing space. A great advantage of this construction is that the current may be turned on to the motor just while the machine is being operated and hence the work be done with the least expenditure of energy. Direct-current motors of 10-horsepower and over, convert 90 per cent to 94 per cent of the electrical energy supplied into mechanical

energy; and the large alternating-current motors used in the great power stations attain an efficiency a little higher than this.

Electric Poten'tial. Potential in electricity is analogous to pressure in hydrostatics and hydraulics. If two tanks of water at different elevations be connected by a pipe, water will flow from the one at the higher level to the one at the lower level and will continue to flow until the difference in level is reduced to zero. Again, in a horizontal pipe through which water is flowing, it will be found that the water flows from that part of the pipe where the pressure is the greater to that part of the pipe where the pressure is less.

If, when two electrically charged conductors are connected by a wire, positive electricity passes from one to the other, that body from which the positive electricity passes is said to be at the higher potential. This passing or flowing of electricity continues until the two conductors are brought to the same potential or their difference of potential becomes zero. Likewise, in a wire carrying an electric current, the current flows from that part of the wire where the potential is the higher to that part where the potential is lower. This difference of electric potential, when considered as the cause of the flow of electricity, is more commonly called electromotive force (abbreviated into the three letters E. M. F.). In the first case mentioned above, the difference of electrical potential was very quickly destroyed by the passage of some of the positive electricity from the first body to the second; the passing of this electricity constitutes what is called a current of electricity, a momentary current in this case. In the second case mentioned above, the flow of electricity continues indefinitely, or the electric current is a continuous one because the difference of electrical potential between the two parts or ends of the wire is steadily maintained by some such means as a battery cell or a dynamo. The direction of the current is taken as the direction in which the positive electricity goes. In

practically all commercial and experimental work the earth is considered as being at zero potential, and a conductor is said to have a positive potential if, when connected to the earth, an electric current flows from it to the earth; if an electric current flows from the earth to it, the conductor is said to have a negative potential. The practical unit, in which potential differences or electromotive forces are measured, is the volt; the electromotive force of a Daniell cell is about 1.07 volts and that of a dry cell 1.5 volts. The difference of potential between the terminals of most incandescent lamps is about 110 volts, which is not particularly dangerous if the terminals are accidentally touched. Potential difference of several hundred volts is very dangerous, and fatal currents are apt to pass through the body if it is subjected to this great potential difference. The electromotive force generated in modern commercial dynamos varies from 125 volts in small direct-current dynamos to 12,000 in the great alternators. Currents produced by a generator of high E. M. F. are frequently called high-tension currents; others, low-tension currents. The difference of potential between the wires of some long-distance transmission lines is often as great as 70,000 or even 90,000 volts. See VOLT; OHM'S LAW.

Electric Quantity. When an electric current flows in a conductor, a certain amount of positive electricity is transferred from a place of high electrical potential to one of lower electrical potential. The quantity or charge so transferred depends both upon the strength of the current and the time it lasts and is accordingly measured by the product of the current strength by the time it lasts. This is analogous to the total quantity of water transferred from a high tank to a lower tank in a given time. The quantity is determined by the product of the current, as so many gallons per second, by the time it lasts, in seconds; the result is gallons of water. In this form a current of electricity may be stated as so many coulombs per second, an ampere being equivalent to one cou-

lomb per second. See ELECTROLYSIS; ELECTRIC CURRENT.

Electric Railway, a railway in which the cars are run by electric motors. In most cases, direct current at a pressure of 500 to 600 volts is supplied by heavy insulated feeder wires running direct from the power house to different points on the line where they join the trolley wire, a heavy, bare, copper wire directly above the center of the track. From this wire current passes by means of the trolley wheel, a grooved wheel bearing against the trolley wire, into the conducting pole above the car and thence to the motors; through the motors to the iron trucks of the car and thence to the rails. Through the rails and the ground it returns more or less directly to the power house, thus completing the return circuit to the dynamos. A car is usually equipped with two or four direct-current series-wound motors, the rated power of such a motor varying from 30-horsepower up according to the weight of car or train to be propelled. The use of several motors instead of one large motor enables the speed to be controlled more economically, the several motors being joined in series when starting and then switched into parallel when the car has attained some speed. The motors are controlled by a rather complicated set of switches and starting resistances, called a controller, which the motorman operates by a single lever. On elevated roads and in some roads where it is not liable to be touched by animals or men, a third rail, supported on insulators, is used instead of the overhead trolley wire, and the current is taken from this rail by a metallic shoe, a brush sliding on it. In still other cases the trolley wire or third rail is placed underground in a conduit with a narrow groove on top, through which a sort of trolley pole extends from the car to the wire. This is an expensive construction giving comparative freedom from danger to persons, but is not much used.

The development of electric railways in the United States has been remarkable since the first one constructed by Thomas

A. Edison at Menlo Park, N. J. Now practically all our street-car systems are electric railways, and suburban electric lines are making it possible for many workers in the city to live in the country or in the smaller neighboring towns. Electricity is now being used to propel the regular railroad trains through tunnels and into and out of the large depots of some of our great cities, thus avoiding smoke and making the service cleaner and safer. Some advantages of electric railways are: the ease and cleanliness of operation in cities and specially-confined places; the far steeper grades that can be used with the motive power distributed over the different cars; and the fact that all the electrical power can be generated in one large stationary and hence efficient power plant. See DYNAMO; STORAGE BATTERY; LOCOMOTIVE, ELECTRIC.

Electric Resistance. When the two ends of a conductor are maintained at different electrical potentials, a current of electricity flows through the conductor. The strength of this current depends upon this difference of potential and upon the size, shape and material of the conductor and somewhat upon its temperature. The conductor offers a resistance to the flow of the current somewhat analogous to the frictional resistance a pipe offers to the flow of water through it. The electrical resistance of a conductor is directly proportional to the area of its cross section and directly proportional to a constant depending upon the material of which it is made. For metals, the resistance increases with a rise in temperature, while for carbon and some other substances it decreases with a rise in temperature. See OHM.

Electric Welding. See ELECTRIC HEATING; WELDING.

Elec'trochem'istry, that branch of chemistry which shows the relation of electricity to chemical change. It is familiar through the chemical action which takes place in the cells of an electric battery and there produces electricity (See ELECTRIC BATTERY). The reverse proc-

ess takes place in electrolysis (See ELECTROLYSIS). In practical affairs electrochemistry is of the widest use. It makes possible electroplating and electrotyping, assists in refining metals, purifying sewage, extracting aluminum from its ores and in manufacturing alkalies, chlorine, phosphorus, etc. See ALUMINUM; CHLORINE; ELECTROPLATING.

Elec'trocution. See CAPITAL PUNISHMENT.

Elec'trode. The terminals by which an electric current enters and leaves a body on which it acts are called the electrodes; that one by which it enters is called the anode; the other the cathode. These terms were first used by Faraday in connection with electrolysis, but they are now applied in many other instances. See ELECTROLYSIS; ELECTRIC LIGHTING.

Elec'trody'namom'eter, an instrument for measuring electric currents, either direct or alternating. It consists essentially of two concentric coils of insulated wire at right angles to one another; one coil is fixed, while the other is suspended by a fine wire and is capable of being rotated through a considerable angle. When currents are sent through these coils, the movable coil tends to set itself parallel to the fixed one with a force proportional to the product of the strengths of current in the two coils respectively, and turns until this tendency is balanced by the twist of the suspending wire. If the current is sent through both coils joined in series, a scale showing the deflection of the movable coil can be marked with the value of the current flowing, and the instrument is then an ammeter. And, since when connected in this manner, the current in both coils would reverse at the same time and the deflection of the movable coil would not be reversed, the instrument will measure either direct or alternating currents. This instrument can also be arranged to measure power, and the scale marked to read watts. See ELECTRIC METER.

Elec'trokinet'ics, that branch of electrical science which treats of the phenomena exhibited by charges of elec-

tricity in motion. It is, thus, that branch of electricity which treats of electric currents in all their varied manifestations. See **ELECTROSTATICS**.

Electrolysis, the decomposition of substances by the passage of an electric current through them. If a current of electricity be passed through water containing a little sulphuric acid, using strips of platinum by which the current enters and leaves the solution, hydrogen bubbles will collect at one strip and oxygen bubbles at the other. If these bubbles be collected, it will be found that the volume of hydrogen is twice that of the oxygen. This separation of water into its constituent gases was first accomplished by Carlisle and Nicholson in 1800.

That strip by which the current enters the water, the one connected to the positive terminal of the source of electricity used, is called the anode; the other, the cathode. The two constituents into which a molecule of the substance is separated are called ions; and the ion which collects about the anode is called the anion, the other, the cation. A substance capable of being separated into two constituents by the passage of an electric current is called an electrolyte; the most familiar electrolytes are solutions of acids or salts of the metals in water.

There are three general laws of electrolysis, first worked out by Michael Faraday in 1830: (1) If the same current be passed through several similar electrolytic cells joined in series, the amount of decomposition is the same for each cell. (2) The quantity of a given substance decomposed, or electrolyzed, in a cell is proportional to the quantity of electricity used, that is, to the product of the current strength by the time it is used. (3) If several cells containing different electrolytes are used in series with the same current, the quantities of the ions set free in the different cells are proportional to their respective chemical combining weights.

When electrodes other than platinum are used, one or both of them are usually affected. Thus with copper electrodes

in a solution of copper sulphate, the anode gradually dissolves and the cathode gradually gains copper from the solution. Electrolysis is used commercially in separating many metals from their ores, in electroplating and electrotyping, and in many lines of chemical industry. It is also the cause of the injury and frequent destruction of water and gas pipes in the neighborhood of electric power houses and electric railways; the return current from the rails to the power house in passing from the ground into the iron pipes and again in passing from the iron pipes to the ground gives rise to the destructive electrolysis. The most nearly successful remedy is to provide heavy copper return circuits from different places along the track direct to the power house.

Electromagnet, a magnet produced by means of the electric current. It is induced by a current flowing through an insulated wire that is wound around the substance to be magnetized, the magnet in this case being called the core. When the current ceases to flow, the magnetic power of the core practically disappears, but immediately reappears when the current is again switched on. During the flow of the current the magnet has fixed north and south poles, depending upon the direction of the current and the winding of coils; if these be reversed, the poles of the magnet are also reversed. The core of the magnet is generally of soft iron or steel. Up to a certain point the strength of an electromagnet is proportional to the number of turns of the wire in the coils multiplied by the amperes of the current. There is a point, however, at which the core is said to become saturated and then the strength of the electromagnet cannot be greatly increased.

Electromagnets are the magnets chiefly used in electrical engineering. They are available because of the ease with which their magnetism is controlled. In time any core of an electromagnet tends to become a weak permanent magnet, and a slight residual magnetism is likely to remain in any core for an appreciable time

after the current is turned off. This residual magnetism hinders the operation of many electrical devices which depend for their usefulness upon instantaneous action, as in railway signals, etc. To avoid this difficulty, a thin strip of non-magnetic metal is placed between the armature and the poles; the residual magnetism is too feeble to work through these and hence its effect is counteracted. On the other hand, the residual magnetism of the field magnets of many direct-current dynamos is depended upon to start the machine to generating, thus being a help rather than a hindrance.

Elec'tromagnet'ic Theory of Light. See LIGHT; TELEGRAPH, WIRELESS.

Electromagnetic Waves. See TELEGRAPH, WIRELESS.

Electromagnetism, that branch of physical science which treats of the relation of electric currents to magnetism and particularly of the production of magnets, called electromagnets, by means of electric currents. See ELECTROMAGNET.

Electrom'eter, an instrument for measuring the difference of electrical potential by the use of electrostatic forces. There are several forms. The simplest consists of a pith ball coated with tin-foil or gold leaf and so hung by a fine fiber that when it and a fixed conductor are charged to the same potential, the displacement of the pith ball by repulsion of like charges measures the potential. A more accurate form, the attracted disk electrometer, consists of a fixed and a movable metal disk insulated from each other and parallel. They are connected to the terminals of the machine whose potential difference it is desired to measure, and one disk becomes positively charged and the other negatively charged. The force needed to keep them from being pulled together by the attraction of their unlike electrical charges is measured and from it the required value of the potential difference is calculated. Other familiar electrometers are: Hankel's, of the first type, which is a modification of the electroscope and indicates a difference of poten-

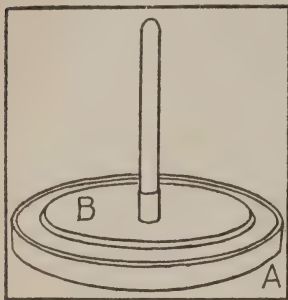
tial by means of the deflection of the gold leaf; the quadrant electrometer, of the second type, except that one disk moves, which takes its name from the four sections of the fixed circular disk connected by wires; and the capillary electrometer, rarely used except for very special purposes. An electroscope is sometimes wrongly called an electrometer. See ELECTROSCOPE.

Elec'tromo'tive Force. See ELECTRIC POTENTIAL.

Elec'tron, the name suggested by Dr. G. Johnstone Stoney in 1891 for the natural unit of electricity. The latest theory of electrification is the electron theory. It holds that electricity has a sort of atomic structure and that exceedingly minute particles of negative electricity, called electrons, are associated with the ordinary atoms of matter. When a body possesses more than its normal number of electrons, it is said to be negatively charged; when it possesses fewer than the normal number, it is said to be positively charged; and a body uncharged, or neutral, is thought of as having the normal number of electrons associated with each of its atoms. An electron, first called a corpuscle, has been shown to possess, or rather to be, a definite quantity of negative electricity equal to the charge associated with a hydrogen atom in the process of electrolysis. Its inertia, or resistance to being put in motion, appears to be about 2000 times smaller than that of a hydrogen atom, thus indicating that the real or apparent mass of an electron is 2000 times smaller than the mass of the hydrogen atom. For instances where the electron is separated from the atoms of ordinary matter, see CATHODE RAYS; X RAY.

Electrophorus, *È lek trof' o rus*, an instrument for producing electric charges by induction, invented by Alessandro Volta in 1775. It consists of a shallow metallic pan, A, containing a flat circular cake of resin, shellac, sulphur or vulcanized rubber. A metallic disk, B, which fits into this, has an insulated handle. The cake is negatively electrified by rubbing it with a piece of flannel or fur.

The disk is then placed upon it but actually touching it at very few points, and becomes charged by induction, the lower side acquiring a positive charge and the upper side an equivalent negative charge of electricity (See ELECTRICITY).



ELECTROPHORUS

If the disk be momentarily touched by the finger while still on, or very close to, the resin, the negative electricity escapes to the ground. The disk, in being removed, is

found to be charged with positive electricity. The experiment may be repeated innumerable times without recharging the resin, for the source of electricity is the energy used in separating the positively and negatively charged bodies.

Elec'tropla'ting, the art of plating with metals by the electric current. The object to be plated, which must be a conductor of electricity, is made the cathode in a solution of some salt of the metal with which it is to be plated; the anode, in commercial work, is a piece of the pure metal. When an electric current is passed through the solution from anode to cathode, metal from the solution is deposited on the object to be plated and metal from the anode is dissolved into the solution, thus maintaining the strength of the electrolyte. For silver plating, a mixture of 500 grams of potassium cyanide and 250 grams of silver cyanide in 10 liters of water is used. For good results the surfaces to be plated must be thoroughly cleaned and the deposit must not be made too rapidly. The thickness of the deposit depends on the time the process is continued as well as on the strength of the current used.

An Italian has perfected a process by which glass, china, wood and other substances can be electroplated as successfully as metals. That part of the glass or china to be plated is first subjected to

a sand blast to remove the polish or glaze, as the case may be. The rough-end part is then treated chemically to make it a conductor of electricity and the article is placed in the bath. Silver, alloys of silver and nickel and of tin and nickel are deposited very successfully by this method. See ELECTROLYSIS.

Elec'troscope, an instrument for detecting the presence of an electric charge and indicating its kind. A small pith ball is suspended by a fine silk fiber and then charged with negative electricity by being touched with a piece of hard rubber that has been stroked with fur. If an electrified body is brought near this ball, the ball will be repelled if the body is negatively charged; attracted if it is positively charged; and unaffected if the body is uncharged. A far more delicate device, called the gold-leaf electroscope, consists of two slender strips of gold leaf suspended from the end of a metal rod and inserted into a protecting glass bottle; the rod passes up through the cork of the bottle and terminates in a small knob outside. The electroscope is usually charged by induction by holding near it an electrified hard-rubber stick and momentarily touching the knob with the finger. On removing the hard-rubber stick, the gold leaves or strips will diverge, due to the repulsion of the like positive charges on them. A positively charged body brought near the knob will cause the leaves to diverge still farther, while a negatively charged body will cause them to diverge less.

Elec'trostat'ics, that branch of electrical science which treats of the phenomena exhibited by electrical charges at rest. Nearly all bodies are capable of being electrified, or put into such a state that they become sources of electric force; and the region around them in which the force is manifested is called an electric field of force. Electrified bodies attract or repel one another and induce electrical charges on near-by conductors. See ELECTRICITY; ELECTRIC MACHINE; ELECTRIC POTENTIAL; ELECTROKINETICS.

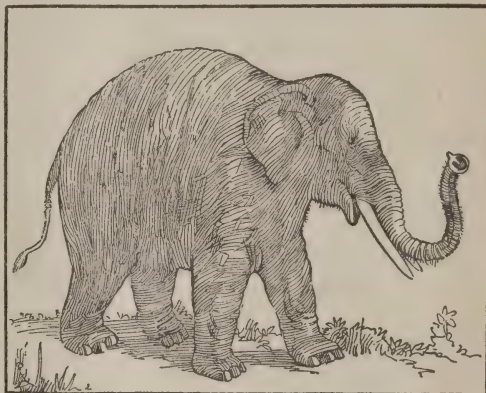
Elegy, *El' e jy*. See POETRY, subhead *Elegy*.

El'ement, in chemistry, a substance which has resisted all attempts to bring about its division into substances differing from itself, and which cannot be formed by the union of other materials. In the early days of chemistry there were supposed to be but four elements, earth, water, flame and air, and all other substances were considered some form of these or of their compounds. At present there are 80 elements known and others whose discovery is predicted. The most common elements are sulphur, iron, chlorine, iodine, bromine, oxygen, hydrogen, carbon, nitrogen, phosphorus, arsenic, antimony, bismuth, silicon and tin. Among those recently discovered are helium, neon, krypton, xenon and lutecium.

El'ephant, the largest land animal known and the only surviving member of the order Proboscidea, or proboscis-bearing animals. The family is represented at present by only two species, known from the regions in which they are found as the African and the Indian elephants. The former are the larger, stronger and more ferocious; their hide is tougher and their ears longer than those of their Asiatic relatives; their backs have a decided slope from shoulder to rump; their foreheads are bulging and their trunks so long as to drag upon the ground even when the sensitive extremity is coiled under. In this species the tusks are borne by both sexes. The Indian elephant is of smaller size, and is more familiar through its frequent appearance in menageries and in the traveling circus. Its back is decidedly rounding, and the tusks are found on the male alone.

The average height of the elephant is eight or nine feet, and its weight is generally between five and six tons. Jumbo, the huge African elephant brought to the United States by Barnum, attained a height of over ten feet, although it had not then reached full size, and in its native wilds might have become even taller. The heavy head of the elephant is supported by huge muscles, which are fastened to the shoulders and give the

animal a short, thick neck. The most noticeable feature is, of course, the long, flexible proboscis, which contains two tubes that pierce its entire length and connect with the nostrils at the lower extremity. This "trunk" is an exceedingly sensitive organ, made up of some 40,000 muscles, and is a member valuable indeed to its possessor. With it he sucks from the stream the water which he blows into his mouth, takes up his food, as with a hand, trumpets his shrill battle cry, sniffs the air for the presence of food or of his foe, and, after a journey in the hot sun, even thrusts it into his gullet to draw from his stomach a stored supply of water with which to spray his parched limbs and body. By fortunate arrangement the water so put to use is



ELEPHANT

always clear, cool and without odor, regardless of the length of time it has been stored. Valves within the trunk and situated somewhat below the middle prevent water or food particles ascending very far into the tube. As has been said, this organ is keenly sensitive, and, when in danger of receiving wounds, is held curled under the body or raised high in the air. It is the seat of the olfactory nerves and thus bears the animal's most highly developed sense, the sense of smell, for, despite the large ears, the elephant's hearing is not good and its eyesight is notoriously poor. The trunk of the Indian elephant ends in two opposable projections which act much like the thumb and forefinger of a hand,

The tusks of the elephant differ from those of other tusk-bearing animals in being the elongated incisor teeth; in other animals the canines are those ordinarily becoming lengthened. The elephant's tusks project outward and upward, sometimes to great length, and are admirable protective weapons, as well as able instruments in securing food. The huge body is covered by a dark gray, somewhat hairy hide, wrinkled in appearance and tough in texture. It is supported by four columnar, flat-footed legs, whose size fits them for the weight they bear. The feet are five-toed, but the toes are almost wholly covered by a fold of skin, which leaves only the five nails visible. The elephant, like man, has a low ankle, and its leg, which bends in the opposite direction from that of the horse, has its knee joint in the same relative position as that of man. In spite of this seeming hindrance, the elephant has a powerful backward kick, which is as sudden and unexpected as it is forceful. Its tail is short, slender and slightly hairy.

HABITS. In its native jungle the elephant is nocturnal, for it suffers keenly from the heat of the sun, readily absorbed by its dark, heavy coat. In lying down to rest it cannot curl its huge limbs under its body, hence it usually seeks a miry spot or the bed of some stream, where it can wallow in its cool depths. Often, like the horse, it sleeps standing or leaning against a tree. The elephant owned by Louis XIV, it is said, did not lie down at all during its captivity, a period of over five years. In spite of its size and awkwardness, the elephant is exceedingly sure-footed. It can climb or descend steep declivities and rarely makes a misstep. When trained to carry a howdah, or covered pavilion for a rider, it is very cautious and will not trust its ponderous weight to frail bridges or uncertain roads.

At its ordinary pace an elephant travels about as fast as a horse walks, although it can make much quicker time if urged by a driver or by hunger. It lifts both right feet at nearly the same

time and then both left, thus adopting a rolling gait most trying to an unaccustomed rider. It is a surprise to find so huge a beast as the elephant so particular about its food; it uses only the leaves of some trees, the bark of others and the soft, woody fibers of others. To secure these it strips them carefully from the surrounding parts by means of its useful trunk and eats them with evident enjoyment. Fruits are always a popular diet, and the breadfruit, pineapple, watermelon, fig, cabbage palm and coconut are all eagerly sought in their season; the latter the elephant eats by first breaking open the shell with its heavy feet. In captivity it is no small task to keep an elephant supplied with food. It requires 600 lb. of fodder, preferably hay, per day, and smaller but regular rations of sweet potatoes, rice and sugar cane.

If the size of an animal's head were a guaranty of brain power, the elephant would be among the most intelligent of animals; the truth is, however, that its brain is comparatively small and not of unusually high order. Elephants are not so intelligent nor so easily trained as are dogs or horses. They do not show the skill of the beaver nor the high grade of ability of the industrious bee and the familiar and little-noticed ant. Could it combine with its great strength the cleverness of these smaller creatures there would be indeed cause to marvel. And yet there is wide difference of opinion as to the amount of intelligence which the elephant possesses. It most certainly has a marvelous memory for places, people and events. One trainer tells of recapturing in a jungle an elephant which had escaped over five years before and after it had been in training for only a few months. Hearing the command "Lie down!" in the voice of its master, the former captive at once obeyed and was easily retaken. Other stories are told of grudges long borne by elephants against cruel mahouts, or drivers, and a final revenge after years have elapsed. An instance is related of elephants being drafted into an emergency fire brigade at one time when Barnum's temporary

circus structures took fire. According to the accounts the elephants worked with industry and evident intelligence, pulling down near-by buildings, removing cages and lumber. How much of this was done under direction of their drivers is, however, not stated.

Other stories relate that the elephant handles tools with its trunk, opens gates and plucks branches with which to fan itself. But the consensus of opinion seems to be that the elephant is the slave of man, and never can become his companion or friend. Under capable direction and when trained to implicit obedience, elephants are of great use in dragging the heavy mahogany logs from their native mountain slopes to the port of shipment. In laying heavy timbers, piling logs for bridge and road construction and in dragging great loads, they are of inestimable service to mankind. A skillful mahout is needed to direct the animal's action by means of a stout, iron-tipped hooked spear, whose prick urges the animal forward or whose pull at the sensitive ear stops it or changes its course. The elephant is also a rapid swimmer and carries great loads in safety across streams. Few authentic accounts may be found of an elephant's interfering independently to aid his master or to save his life. Instead, captives are generally uncertain of temper, panicky and given to sudden, unexpected timidity. For these reasons they are being abandoned for use in the hunt and in war since the invention of firearms. The Africans who pursue the huge creature only to kill it and never to take it captive make use of every portion of it; the hide makes shields, the bones and tusks are implements of war and the chase, and the flesh is their food. The Indians use only the tusks and leave the rest of the body where it falls. When they take it alive they fit it with rich trappings and make it a part of their Oriental pageants.

The elephant reaches maturity when about 40 years of age; it is difficult to know the average length of life of the wild elephants, but judging from cap-

tives, whose term of years is always shortened, in its native state the elephant must live about 150 years. It is said that the body of an elephant dying a natural death has never been found.

Elephants are captured by means of snares, pitfalls, stockade-surrounded inclosures, or by wounding. When taken, they are first starved into submission, then won by kind treatment and trained. Dead, the elephant is valued chiefly for the ivory produced by its tusks. The ordinary two-tusked elephant produces about 140 lb. of ivory, but the largest single tusk ever recorded contained 188 lb. Roosevelt's *African Game Trails*, Sir Samuel Baker's *Wild Beasts and Their Ways* and John Hammond Porter's *Wild Beasts* give entertaining accounts of this giant animal in its native haunts. See IVORY.

Elephant Seal, a large Southern seal, which has received its name because of its huge size and because of the proboscislike snout which the adult male develops. These seals make their homes in salt water but are sometimes found in the fresh water of inland seas some miles from the coast. They travel to these lakes at an awkward, lumbering gait and with a panting respiration. In general they are harmless, but the females defend their young with great fierceness. The elephant seals are hunted for an oil produced in great quantities just beneath the skin. The flesh, though sometimes used as a food, is not particularly desirable.

Elevated Railway, a railway built upon a framework of steel or masonry high enough so that the cars of surface lines may pass beneath. The great additional investment required for the construction of such a track and its stations obviously can be justified only where a very large and congested population find other means of transportation insufficient or unsatisfactory. In various cities, however, such conditions have developed, since the congestion has been increased by the erection of numerous modern skyscrapers. In some cities, after doubling car lines in this way, it has been found

necessary to provide other lines in subways.

In some places elevated railways secure a private right of way. Very commonly, however, they utilize streets, the necessary framework being supported on steel pillars set opposite each other along the curb line, while iron stairways lead from the sidewalk to the station platforms. The world's first elevated railway was opened to travel on July 2, 1867, in New York City. This was first operated as a cable line, but later by steam locomotives. After 1872, other elevated lines were constructed in New York; and Brooklyn, Boston and Chicago, Liverpool, Paris and Berlin subsequently adopted the idea. The Liverpool Overhead Railway, completed in 1893, was operated by electricity from the beginning, and was the first in the world of this class; although the Intra-Mural Railway of the Columbian Exposition, held that year in Chicago, was likewise successfully operated by electricity. The principal elevated railway of Berlin is supported by a viaduct of masonry, which is remarkable for its fine architectural features.

El'eva'tor, a mechanical device for hoisting loads from one height or level to another. Those used for handling coal or grain out of ships' holds, or for similar purposes, consist of a number of elevator buckets fastened to a flat belt which travels over two pulleys, one above in the head and one below in the boot of the elevator. An elevator used to raise goods and people from one floor of a building to another consists of a movable platform or cage operated by steam, water or electric power. These contrivances are comparatively modern, and their perfection, particularly the electric passenger elevator, has made possible the utility of high buildings for office and business purposes.

El'gar, Sir Edward William (1857-), an eminent English musical composer. He was well educated in music, being taught to play the violin and organ, and his work has had distinguished recognition. In 1904 he was knighted by

Edward VII and in the next year was made professor of music in the Birmingham University. Yale University has conferred upon him the honorary degree of doctor of music. His most important compositions are *The Light of Life*, an oratorio; *The Apostles*, written for chorus; and a *Te Deum*.

Elgin, El'jin, Ill., a city of Kane Co., 36 m. n.w. of Chicago, on the Fox River and on the Chicago, Milwaukee & St. Paul, the Chicago & North Western and other railroads. The Aurora, Elgin & Chicago third-rail electric line also connects the city with Chicago, and there is an excellent street-railway service throughout the city. The Fox River is here spanned by several bridges and affords extensive water power. Elgin is situated in an agricultural and dairying region and is an important market for butter. Other industries to which the city largely owes its growth and prosperity are the making of fine watch movements and cases, and milk condensing.

PARKS AND BOULEVARDS. The city is attractively located and contains broad and well-shaded streets and many handsome residences. There are a number of public parks, which include Wing Park of 121 acres and Lord's Park of 112 acres.

PUBLIC BUILDINGS. The noteworthy buildings include a city hall, a post office, a number of banks and substantial stores and business houses. Elgin is sometimes called the "City of Churches" from the number and beauty of the many church edifices.

INSTITUTIONS. The educational institutions include the Elgin Academy of the Northwestern University, a preparatory school for the latter institution, which is located in Evanston, Ill., a high school, public and parish schools, St. Mary's Academy (Catholic), the Gail Borden Library with a large number of volumes, a college of music and a manual-training school. The benevolent and charitable institutions include the Illinois Northern Hospital for the Insane, the Elgin Woman's Club Hospital and a city hospital.

INDUSTRIES. The numerous manufac-

turing plants of the city include the condensed-milk works, watch-movement and watch-case factories, silver-plate works, a piano factory, cut-glass works, foundries and machine shops, flour mills, shirt factories, boot and shoe factories, rug factories, automobile works, farm-machinery works, coffin-fixture works, publishing and printing plants and butter-tub factories. There is an extensive trade in butter, cheese and agricultural products.

HISTORY. Elgin was first settled in 1835 and was chartered as a city in 1854. A recharter was given in 1880. The city has the commission form of government. Population in 1920, U. S. Census, 27,454.

Elgin Marbles, a collection of ancient sculptures removed from Athens by Thomas Bruce, the seventh Earl of Elgin, while he was the English ambassador at Constantinople (1799-1802). Athens was at that time a Turkish possession and was but a wretched village whose formerly beautiful buildings were tumbled down or buried by the refuse of years. Lord Elgin made excavations which revealed many of the works of Phidias, relics of the Parthenon and numerous statues, capitals and other treasures. These he took to England, where they occupy at present the Elgin room of the British Museum. The collection was purchased by the British Parliament in 1816 and is considered one of the most valuable in existence. Through their transportation from Athens they were probably preserved from destruction during the subsequent war for Greek independence, when the Parthenon was partially destroyed.

Eli'jah, a great Hebrew prophet, in the Septuagint and New Testament called Elias. He flourished in the reigns of the Israelitish kings, Ahab and Ahaziah, in the ninth century B. C., and it was his special mission to combat the evil work of the rulers of Israel and to call down vengeance upon them. In the New Testament John the Baptist is represented as coming in the spirit and power of Elijah (Elias), in fulfillment of the prophecy of Malachi. Elijah ascended to

heaven in a chariot of fire, in the presence of his successor Elisha.

Eliot, Charles William (1834-), an American educator, for 40 years president of Harvard University, was born in Boston. He graduated at Harvard in 1853, after which he remained as tutor and assistant professor until 1863. The next six years were divided about equally between European study and the duties of a professorship in the Massachusetts Institute of Technology. His attitude toward educational problems is indicated by a volume entitled *Educational Reform*. His administration as president of Harvard began in 1869 and was noteworthy both for length of service and for extent of influence. He eliminated Latin and Greek from the list of required studies, emphasized the value of modern languages and laboratory methods, established the elective system and developed the graduate schools. These reforms materially affected the educational progress of the entire country. He retired in 1909. Some of the most influential books he has written are "*Charles Eliot Landscape Architect*," 1902, "*John Gilley*," 1904 and "*The Durable Satisfaction of Life*," 1910.

Eliot, George (1819-1880), the pen name of Mary Ann (Marian) Evans, a foremost English novelist. She was born at South Farm, Warwickshire, on the estate of Mr. Francis Newdigate, for whom her father acted as agent. Brought up in the heart of the farming section of the English midlands, she gave in her early writings a faithful picture of the country life she knew in her girlhood, basing her characters on the people about her. Maggie Tulliver in *The Mill on the Floss* represents most distinctly her own personality. Her schooling was interrupted in 1835 by her mother's illness, and after the death of Mrs. Evans in 1836, Marian took charge of the household, a duty which she performed for many years. During this time, however, she devoted herself to reading and to the study of German, Italian and music. When she was 21 her father removed to Coventry, an energetic manufacturing

town, where she gained a broader outlook that resulted in the renunciation of her early faith, and she was never orthodox again.

In 1846 appeared her first published work, a translation of Strauss's *Leben Jesu*. Five years later she was in London on the editorial staff of the *Westminster Review*, writing here several notable papers and becoming acquainted with Herbert Spencer, Carlyle, Harriet Martineau and George Henry Lewes. With Lewes she formed a close relationship, which both regarded as marriage, and through his influence she turned to writing fiction. George Eliot's first story, *The Sad Fortunes of the Rev. Amos Barton*, appeared in 1857, and was followed by others of a similar nature, which were published later under the title *Scenes of Clerical Life*. Both Dickens and Thackeray praised the book. *Adam Bede* (1859) was received by the public with great enthusiasm, and established her position as a great novelist. She continued to write until the death of Mr. Lewes in 1878, an event which was the death-blow to her creative powers. In 1880 she married a valued friend, Mr. J. W. Cross, but lived only a few months after her marriage.

Adam Bede, with its simplicity, freshness and admirable portrayal of Derbyshire scene and character, is George Eliot's most natural book. After that the author became more analytical and philosophical. Not content simply to picture life as she saw it, she introduced into her stories elaborate psychological analysis, striving to reveal the forces that moved her characters to action, and while she made them individual, she aimed to make their lives typical of general moral laws. The study of the conscience or intellect was far more fascinating to her than the problem of some social evil. All of her stories reveal her earnestness, tolerance, sympathy with noble aspirations, brilliant powers of wit and keen insight into human nature.

George Eliot's chief writings are: the short stories in the collection *Scenes of Clerical Life*; the novels *Silas Marner*,

Adam Bede, *The Mill on the Floss*, *Romola*, *Felix Holt*, *Middlemarch* and *Daniel Deronda*; and the poem *The Spanish Gypsy*.

Eliot, John (1604-1690), "the apostle to the Indians," a celebrated linguist and divine born in England and graduated from Cambridge University. In 1631 he came to Boston and was pastor for a time of a church there. Later he was over a congregation in Roxbury. He learned the Indian language, and by preaching to the Indians in their native tongue he converted over 3000 to Christianity. He translated both the Old and the New Testament into the Indian language. This Indian Bible was one of the first books printed in America. It is now very rare and copies sell at fabulous prices. Eliot's converts were known as "Praying Indians," and a number of them fought with the whites in King Philip's War. There are monuments to Eliot at South Natick and Newton, Mass.

Eliot, Sir John (1592-1632), an English statesman, born in Port Eliot. He entered Parliament in 1614, where he became an influential leader. He demanded the rights of Parliament which James I had repudiated, caused the impeachment of Buckingham, and was foremost in securing from the King the Petition of Right in 1628, a document second only to the Magna Charta in importance.

Eli'sha, a Hebrew prophet called, in the New Testament, Eliseus. He was the disciple and successor of Elijah, coming into his office during the reign of Jehoram. He lived until the reign of Joash, and, though a less striking and heroic character than Elijah, he figured in several miraculous incidents. The story of Elisha is found in the books of *Kings*.

Elix'ir, a name once variously applied by alchemists to signify a substance which would prolong life indefinitely, or which would turn baser metals into gold. At present the term is used by pharmacists and physicians to represent any aromatic sweetened compound generally dissolved in alcohol and acting medicinally as a tonic. It is also used in connection with many patent medicines.

Eliz'abeth (1533-1603), Queen of England, daughter of Henry VIII and Anne Boleyn. Declared illegitimate upon the execution of her mother, she was finally placed in the line of succession after Edward VI and Mary. She received a good education, attaining skill in music and the sciences, and learning to converse freely in German, French, Italian and Greek. At the age of 25, immediately after the death of Mary in 1558, she was recognized queen by Parliament, to the great joy of Protestants. Her first work was to reestablish the independence of the Church of England along the lines adopted by her father, Mary, her predecessor, having restored the Catholic Church. Elizabeth accomplished this task through a special Parliament, early in 1559, which passed the Act of Supremacy, declaring her to be the head of the English Church, and the Act of Uniformity, requiring the use of the English Prayer Book by all and attendance at the Established Church.

The reestablishment of Protestantism greatly incensed the Catholics of England and the Continent, and this feeling was increased by Elizabeth's execution of her cousin, Mary Stuart, Queen of Scots, after 19 years' imprisonment, for alleged complicity in Catholic plots to put her upon the English throne in place of Elizabeth. Philip II of Spain prepared a great fleet, called the Invincible Armada, and undertook to invade England to avenge the death of Mary and other grievances; but his fleet was overwhelmed by the navy of England and the storms of the English Channel. This outcome made it certain that England would be permanently Protestant, gave encouragement to the Protestant cause on the Continent and established England as mistress of the seas. The nation thus became free to lay the foundations in this reign for its policy of colonial expansion, and to send its ships of commerce into every part of the world. See MARY STUART; SPANISH ARMADA, THE.

Elizabeth's reign was also characterized by a remarkable literary activity, expressive of the creative intellect and imagi-

ination of the new age. It was the period of Shakespeare and Bacon, of Moore's *Utopia* and Spenser's *Faerie Queene*. Taken all in all, the reign of Elizabeth, covering a period of nearly 45 years, was one of the most glorious in the annals of English history. While much of what Elizabeth accomplished was due to the able ministers who formed her council board, yet she herself was a woman of unusual political sagacity and statesmanship. Whatever personal faults she may have had, she was devoted to her country's interests and planned wisely for its future. She never married, and upon her death the crown passed to James, King of Scotland.

Elizabeth, N. J., a city and county seat of Union Co., 4 m. s.w. of Newark and 12 m. s.w. of New York City, on Newark Bay, Staten Island Sound and both sides of the Elizabeth River, and on the Lehigh Valley, the Pennsylvania, the Baltimore & Ohio, the Central Railroad of New Jersey and other railroads. The portion of the city bordering on Staten Island Sound is known as Elizabethport. The city is attractively situated and contains the suburban homes of many New York City business men. The harbor is accessible for small vessels and receives large quantities of anthracite coal and iron brought by rail from Pennsylvania for reshipment.

PARKS AND BOULEVARDS. The city is well laid out on a level site, with broad and graded streets, and contains many handsome residences. There are a number of small parks within the limits of the city. Interurban electric lines extend to the neighboring towns and cities.

PUBLIC BUILDINGS. The city contains the Union County Courthouse, city hall, Federal Building and several historic buildings, including Liberty Hall, the mansion of William Livingston, the first governor of the state, the old brick mansion of Jonathan Belcher, governor of the province from 1747 to 1757, the house occupied by Gen. Winfield Scott, and the first home of Princeton University.

INSTITUTIONS. The educational insti-

tutions include 17 public elementary schools, Battin H. S., a girls and a boys vocational school, a Junior High School, and Pingry and Vail-Deane private schools. Among the public institutions are the Alexian Brothers, St. Elizabeth and Elizabeth General hospitals, an orphan asylum, Day Nursery, an old ladies' home. Soft drinks, Willys auto plant and many others.

INDUSTRIES. The principal industrial establishments include a sewing-machine plant, which is one of the largest factories for the manufacture of sewing machines in the world, car-repair shops, steelworks, chemical works, foundries, oil refineries, copper-smelter works, pump works, shipyards and manufactories of oilcloth, hats, mill machinery, stoves, hardware, edge tools, cordage, combs, harness, saws and wire.

HISTORY. The first settlement was made in 1665 by a company from Long Island who had purchased land from the Indians. The town was named in honor of Elizabeth, wife of Sir George Carteret, and was first known as Elizabethtown. It was the state capital from 1755 to 1757. In 1748 the place was incorporated as a borough and in 1855 a city charter was granted. Population in 1920, 95,783.

Elizabeth City, N. C., a city, port of entry and the county seat of Pasquotank Co., 50 m. s. of Norfolk, Va., and about 145 m. n.e. of Raleigh, on the Pasquotank River and on the Dismal Swamp canal. The Norfolk & Southern and the Suffolk & Carolina Coast enter the city. There is a good harbor. A large wholesale trade in clothing, groceries and general merchandise is carried on, and cotton, lumber and fish are shipped. Oyster cultivating is an important industry. The city is the center of large trucking interests; and it contains saw and planing mills and gristmills, ironworks, cotton mills, cotton gins, machine shops, shipyards and manufactories of nets, twine, wagons, carriages and mattresses. At Elizabeth City is located the Colored State Normal School. The city has an excellent system of public schools,

housed in a half million dollar plant. The place was settled in 1793 and was incorporated in the same year; it is governed under a charter of 1905. Population in 1920, U. S. Census, 8,925.

Elk, the largest-known European deer and differing only slightly from the American moose and the stag. It is a powerful animal with huge antlers and strong shoulders. In northern Europe it



ELK

is protected by law and has been domesticated to act as a beast of burden. The American elk is the wapiti. See WAPITI; MOOSE.

Elk'hart, Ind., a city of Elkhart Co., 15 m. e. of South Bend and 101 m. e. of Chicago. Elkhart is on the St. Joseph River, and on the Cleveland, Cincinnati, Chicago & St. Louis, the Lake Shore & Michigan Southern and other railroads. It is an important railroad center and shipping point for a large agricultural region. The rivers here afford abundant water supply, and the manufacturing industries include bridge and iron works, railroad shops, paper mills, band-instrument works, wagon and carriage factories. The Elkhart Institute is located here. There are several fine parks and an excellent public library. Population in 1920, 24,277.

Elkins, Stephen Benton (1841-1911), a United States senator, born in Perry County, Ohio. He early removed to Missouri, where he graduated from the state university in 1860, and studied law. In 1862-63 he served as captain in the army, then went to New Mexico, where he was admitted to the bar and accumulated a fortune in mining and stock raising. He served as a delegate to Congress from that territory from 1873 to 1877. Removing to West Virginia, he became interested in coal and railroads. In 1891 he was appointed secretary of war, and was elected to the United States Senate in 1894, where he served until his death.

Elks, Benevolent and Protective Order of, a charitable and benevolent organization founded in New York in 1871 by members of the theatrical profession. Its scope was soon expanded to admit men of other callings and the order grew rapidly. In 1919 it had about 600,000 members. There is one grand lodge national in scope, and sublodges which have local significance only. The badge is an elk's head worn as a pin or button.

Ells'worth, Oliver (1745-1807), an American statesman, born in Windsor, Conn. He graduated at Princeton in 1766; was admitted to the bar in 1771; was elected to the Connecticut Legislature in 1775; was a delegate to the Continental Congress in 1778; and was an influential member of the convention at Philadelphia in 1787 that formulated the Federal Constitution. In 1789 he was elected senator under the new government to represent his state, and became the recognized Federalist leader of that body. John Adams called him "the finest pillar of Washington's whole administration." He was chief justice of the United States Supreme Court from 1796 to 1799, when he became one of the commissioners to adjust the strained relations between the United States and France.

Elm, a North American tree, or rarely a shrub, of the Elm Family, found everywhere in southeastern Canada and

in the United States east of the Rockies. The elm is a graceful tree in winter as well as in summer and is easily recognizable by its spreading branches. The white, or water, elm, which is most common in the United States, has a tall trunk, generally undivided until 30 ft. or more above the ground and then separating into a few large limbs which still extend upward, giving the tree the graceful vaselike form so familiar in Northern landscapes. The base of the trunk is often widened slightly, continuing the effect which gives this tree the name "vase elm." The bark is rugged and often gray with lichens. The branches which in winter bear plump leaf buds in alternating positions upon the stems, in summer are covered by oval, pointed leaves with unequal lobes, toothed margins and prominent veins. The flowers appear before the leaves, and are close, small clusters of blossoms which produce a dry, winged fruit. The wood of the white elm is valuable for wagon manufacture, tool handles, etc., on account of its toughness and flexibility.

The cork, or rock, elm grows mostly on high ground and has a straight columnar trunk with drooping branches. The winged elm is smaller and is found south of the Ohio River. The slippery, or red, elm has a larger trunk which divides nearer the ground in mammoth branches. The inner bark of this tree is sweet and mucilaginous and is used in medicine or prized by the small boy, who cuts it in strips to chew.

The elm is a famous tree in American history, for under the shade of one, Penn's treaty with the Indians was ratified, and beneath the Cambridge elm, which still stands, Washington took command of the American army. The elm is truly an American tree, for, though growing in Europe and England, it is not there highly prized.

Elmira, N. Y., a city and county seat of Chemung Co., 46 m. s.w. of Ithaca, 149 m. s.e. of Buffalo and 262 m. n.w. of New York, on both sides of the Chemung River, at the mouth of New-

town Creek, and on the Erie, the Delaware, Lackawanna & Western, the Pennsylvania, the Lehigh Valley and other railroads. The Tioga Division of the Erie Railroad runs directly from the city 46 m. into the coal fields of Pennsylvania. There is also unexcelled street-car service connecting the city with Waverly, Corning, Sayre and Athens. The Glen Route high-speed trolley makes Elmira within an hour's ride of Watkins Glen, the state park noted for its picturesque scenery and great beauty. Elmira is situated in a rich agricultural region and is noted for the extent and variety of its manufactures.

PARKS AND BOULEVARDS. Elmira is well laid out with many miles of paved streets and has a fine park system, which includes Eldridge, Rorick's Glen, Riverside, Hoffman, Grove, Maple Avenue and Wisner parks. In the last-named park is a statue of Thomas K. Beecher, designed by J. S. Hartley.

PUBLIC BUILDINGS. The city contains a state armory, Federated Charities Building, Federal Building, Chemung County Courthouse, a Y. M. C. A., New Library and a number of handsome buildings for various social clubs of the city.

INSTITUTIONS. The educational institutions include Elmira College (Presbyterian), founded in 1855. This was the first collegiate institution for women in the United States. There are also the Elmira Free Academy, Steele Memorial Library and a Railway Commercial Training School which prepares young men and women for railway work. Among the charitable institutions are the Southern Tier Orphans' Home, a home for the aged and Arnot-Ogden Memorial Hospital. The most widely-known institution in the city is the Elmira Reformatory (See PRISON), a state prison for first offenders, between the ages of 16 and 30 years.

INDUSTRIES. Among the more important establishments are fire-engine and motor-truck construction works, the largest in the world, lumber and planing mills, iron- and steel-bridge works, knitting mills, cut-glass and

glass-bottle factories, hardwood-finishing works, valve works, sash, door and blind factories, greenhouses, silk mills, automobile factories and manufactories of tobacco products.

HISTORY. Near the present site of Elmira the Battle of Newtown was fought on Aug. 29, 1779. The battleground is now marked by a monument to General Sullivan, who defeated with an American army a force of Indians and Tories led by Sir John Johnson and Joseph Brant. The first permanent settlement was made in 1788 and the village incorporated as Newtown in 1815. The name was changed to Elmira in 1828. A city charter was granted in 1864. Population in 1920, U. S. Census, 45,393.

El Paso, El Pah' so, Tex., a city, port of entry and the county seat of El Paso Co., on the north bank of the Rio Grande River and on the El Paso & Southwestern, the Atchison, Topeka & Santa Fe, the Mexican Central, the Galveston, Harrisburg & San Antonio, the Southern Pacific, the Mexico North-Western, the Texas & Pacific, and other railroads. El Paso has an altitude of 3762 ft. above sea level, and the climate has been found beneficial to the treatment of tubercular trouble. Flowers bloom profusely the year round. El Paso has made rapid progress in manufacturing activities, the total factories, large and small, now numbering 125. The city has the largest copper-lead smelter in the world, the ore being purchased from Arizona, New Mexico, West Texas and Mexico. In El Paso is also located the largest box factory and planing mill in the country, which utilizes lumber from a 3,000,000-acre forest in Western Chihuahua. Opposite the city, across the Rio Grande, is the Mexican town of Juarez, with which El Paso is connected by two international bridges and an electric railway. There is a modern street-car system.

STREETS AND BOULEVARDS. The streets are wide, well lighted and paved, and there are numerous handsome residences. The city contains 14 parks noted for their floral beauty, among the number being San Jacinto Plaza. Cloudcroft, a

popular mountain resort, some distance northeast of the city, has an elevation of 9000 ft.

PUBLIC BUILDINGS. The noteworthy buildings include a Federal Building, city hall, courthouse, Y. M. C. A. and Y. W. C. A. buildings, Union Station, a public library, Chamber of Commerce, the Stevens, Caples and Groesbeck buildings, Post-Office, New High School, banks, theaters, hotels, substantial business blocks and about 36 churches.

INSTITUTIONS. Among the educational institutions are Texas School of Mines, El Paso School for girls, a high school and public and private schools. Other institutions include the Baldwin Sanatorium and the Sisters and Providence hospitals. Ft. Bliss, the principal United States military post of the Southwest, is located near the limits of the city.

INDUSTRIES. El Paso is situated in the fertile Rio Grande Valley, irrigated by the Engle reclamation project, and the city is an important trading center in mining machinery and supplies. It has an extensive jobbing trade. The industrial establishments include coffee-roasting and packing plants, fruit canneries, sheet-metal works, dressed-meat plants, flour mills, foundries and machine shops, box and crate factories and manufactories of furniture, clothing, farm implements, electrical supplies, trunks, mattresses and dairy products. The Elephant Butte Dam in the Rio Grande Valley is located 12 m. from Engle, N. M., and about 100 m. north from El Paso. This project, as completed by the United States Government, impounds the flood waters of the Rio Grande and irrigates over 200,000 acres.

HISTORY. In 1858 El Paso, then known as Franklin, was but a small village. Its growth was slow until 1873, when a city charter was granted. The commission form of government was adopted in 1907. Population in 1920, U. S. Census, 77,560.

El Reno, Okla., a city and county seat of Canadian Co., 29 m. w. of Okla-

homa City, on the North Branch of the Canadian Pacific and on the Choctaw, Oklahoma & Gulf, the Chicago, Rock Island & Pacific, the St. Louis, El Reno & Western and other railroads. The city is situated about 1360 ft. above sea level in a fertile agricultural region, and wheat, corn, oats and cotton are extensively grown. The public schools system is excellent and up-to-date with well equipped buildings and modern courses of study. A government boarding school for the Indians of the Arapahoe and Cheyenne reservations is located near the city. El Reno contains grain elevators and flour mills. Brick and crockery are also among the manufactured products. Ft. Reno, a government military post, was established near El Reno in 1876, and in 1908 it became a supply depot for the quartermaster's department. The city contains good municipal buildings and a Carnegie library. The first settlement, apart from Ft. Reno, was made in 1889, and three years later a city charter was granted. Population in 1920, U. S. Census, 7,737.

Elves, *Elwz*, in Norse mythology, lovely, beneficent creatures inhabiting Alf-heim, a region between heaven and earth. So tiny were they that, unseen, they could flit about caring for the flowers or frolicking with the butterflies and birds. For their nightly revels, they used to slip down to earth on a moon-beam. To stand in the middle of one of the "fairy rings" of green grass which they made was, by the Norse, considered a sign of death. Very musical, the elves delighted in an elf dance so fascinating that if a mortal attempted to play it, he generally continued till he dropped dead from exhaustion. In later times sacrifices, usually a small animal or honey and milk, were offered to propitiate the elves, who were worshiped as household gods. As such, their images were cut above doors. The German conception of elves was almost identical with the Scandinavian.

Elwood, Ind., a city of Madison Co., 50 m. n.e. of Indianapolis and 44 m. s.e. of Logansport, on Duck Creek and on

the Lake Erie & Western, the Pittsburgh, Cincinnati, Chicago & St. Louis and other railroads. It is situated in the natural-gas belt and is surrounded by a fertile agricultural region. It carries on a large trade in grain, farm products and live stock. Elwood has flour mills, planing mills, brickyards, tin-plate mills, plate-glass and lamp-chimney factories, stove foundries, a canning factory and ironworks. It was formerly known as Quincy. Population in 1920, 10,790.

E'ly, Richard Theodore (1854-), an American political economist, born in Ripley, N. Y. He studied in the universities of Columbia, Halle, Heidelberg and Genoa, and became professor of political economy in Johns Hopkins University in 1885. Since 1892 he has been professor of political economy and director of the school of economics and political science in the University of Wisconsin. His views on social and political questions reveal the thinking of a progressive reformer. Among his works are *French and German Socialism in Modern Times*, *Labor Movement in America*, *Socialism and Social Reform*, *Introduction to Political Economy*, *Outlines of Economics* and *Studies in the Evolution of Industrial Society*.

Ely'ria, Ohio, the county seat of Lorain Co., at the junction of the East and West branches of the Black River. The main line of the N. Y. C., and also on the B. & O. Railroad, and has excellent interurban trolley service. It lies 8 m. s. of Lake Erie and 25 m. s.w. of Cleveland. It is a rapidly growing manufacturing city, and its products include steel, tubing, auto accessories, phonographs, furnaces, stoves, chemicals and many other articles, 90% of the people own their homes. Natural Park, contains 150 acres. Population in 1920, 20,474.

Eman'cipa'tion, Pro'clama'tion of, the document issued by Abraham Lincoln, as commander-in-chief of the United States armies, Jan. 1, 1863, declaring the immediate freedom of the great majority of the slaves in the United States. The anti-slavery leaders in the

North had for a long time urged such proclamation, but President Lincoln had resisted the appeals, as he thought public opinion was not ready to accept it. In replying to such suggestions, he said, on Aug. 22, 1862, "My paramount object is to save the Union, and not either to save or destroy slavery." It became evident at length that slavery was a source of military strength to the Confederate cause, since slave-labor provided the means of supporting the Confederate forces in the field, and that it must be destroyed if the Union was to live. The President, accordingly, issued a preliminary proclamation giving notice that on Jan. 1, 1863, "all persons held as slaves in any state, the people whereof shall then be in rebellion against the United States, shall be then, thenceforward and forever free." This notification produced no effect and on the first day of January, 1863, President Lincoln issued the final Proclamation of Emancipation, which declared free all persons held as slaves in the states then in rebellion. This proclamation was given effect as fast as territory came under Federal control. The work of emancipation was completed in the United States by the adoption of Article XIII of the amendments to the Constitution, and the reconstruction of the states proceeded upon that basis.

Eman'uel I (1469-1521), King of Portugal, called the Great. He was surnamed the Happy, and his reign was justly spoken of as "the golden age of Portugal." The important voyages of Vasco da Gama, Cabral, Americus Vesputius, Albuquerque and Corte-Real during his reign established the naval and colonial preeminence of Portugal, which soon became recognized as the commercial center of the world. A code of laws, prepared by him, bears his name, and he furthered education and internal improvements. He carried on missionary enterprises, urged an international crusade against the Turks and persecuted and expelled the Moors and the Jews.

Embalming, *Em bahm'ing*, the art of preparing dead bodies in such a way as

to prevent corruption and decay. The Egyptians, 4000 B. C., practiced it as a religious function. Their method consisted of removing all the organs from the interior of the body and filling the cavities with myrrh, cassia and other materials obtained from herbs and barks containing preserving oils. The body was then steeped in a solution of carbonate of sodium and finally wrapped in many linen bands (See MUMMY). In modern times undertakers practice the art by using chloride of zinc, bichlorate of mercury and arsenic (all poisons). These are made into fluid and injected into the blood vessels and cavities. These, however, preserve the body for only a limited time, and are chiefly useful to prevent danger from infection.

Embar'go Act, a legislative decree directing the detention in port of vessels, whether foreign or national. The object of such a drastic measure may be to deprive other nations of commodities, or it may be intended as a means to bring about the seizure of foreign ships in local ports, or to enable the government to obtain ships for use in time of an emergency. The first embargo act in the history of the United States was laid on March 26, 1794, in retaliation for the British Orders in Council, and remained in effect for 60 days. Subsequently, during the wars between France and Great Britain, successive French decrees and British orders drove the United States to the laying of a stricter embargo, on Dec. 22, 1807. Under it American ships could not leave for foreign ports, and foreign vessels could leave American ports only without a cargo. This law was replaced in 1809 by the Non-Intercourse Act. During the war of 1812 an embargo was enacted in 1813. The most recent and far-reaching embargo in American history was that put in force July, 1917, to regulate exports to neutral countries during the war with Germany. The end sought in this case was to prevent supplies reaching the Teutonic allies through shipment to other countries.

Embez'zlement, the appropriation by a custodian of money or other prop-

erty placed in his care as a trust. Embezzlement is theft, but in general law it is ground for action for recovery of the property only. In the United States, however, embezzlement is considered a fraudulent act and is severely punished.

Emboss'ing, the art of making raised figures or designs in relief upon plain surfaces. Fabrics, paper and leather are generally embossed by means of heated rollers with engraved dies carrying the design. Metal may be embossed by hand by hammering or beating it up on the underside.

Embroid'ery, the art of working with a needle ornamental designs upon fabrics and other materials. It is one of the oldest arts, and was practiced by the ancient Egyptians. Embroideries were first worked in cotton, on linen and wool; afterwards silk was used. The Chinese and Japanese produce the finest silk embroideries. Silk, gold threads, beads, spangles and precious stones are used to embroider with among the Turks and Persians. Machines now do much of the work in embroideries that are found in the shops.

Em'erald, a brilliant gem of the beryl variety. It is one of the softest of precious stones, though unaffected by acids, and is usually prismatic in form. It is of pure, bright green color and is inferior as a jewel only to the diamond and ruby. The ancients, who used it chiefly for engraving, procured the stone from Africa. The finest specimens mined today come from Colombia in South America, and some have been found in North Carolina.

Em'erson, Ralph Waldo (1803-1882), an eminent American poet and essayist, born in Boston. Descended from a long line of clergymen, his oldest American ancestor having founded the Christian Church in Concord in 1635, Emerson could rightly claim a goodly inheritance of those qualities that make for character and culture. His father, who was pastor of the First Church (Unitarian) in Boston, died in 1811, leaving five sons to be educated in a manner befitting family traditions. An in-

mate of the household, Aunt Mary Moody Emerson, a brilliant and eccentric woman who was a constant stimulus to her young nephews, had an important part in the early training of Ralph Waldo. After his preliminary schooling in Boston, Emerson entered Harvard College at the age of 14, coming there under the influence of such distinguished teachers as Edward Everett, George Ticknor and Edward Channing. He graduated in 1821, ranking about half-way down the class in general scholarship, but he won prizes for brilliant work in literature and oratory, and he was elected class poet.

TEACHER AND MINISTER. For three years after his graduation Emerson taught school, then studied theology at Cambridge and in 1826 was ordained a Unitarian minister. In 1829, the year of his marriage to Miss Ellen Tucker of Boston, he became associate minister of the Second Church (Unitarian) of Boston, and was soon the sole pastor. Emerson's ministry, though brief, made a lasting impression. His resignation in 1832 was the result of his conviction that the Lord's Supper was not a permanent sacrament, and should be observed only as an act of remembrance. In this his church could not follow him. A few months before his resignation his wife had died, and the double sorrow, for his connection with his people was very close, so depressed him that he sought rest and relaxation in Europe. Emerson spent two months in England and Scotland and visited Landor, Coleridge, Wordsworth and Carlyle, the last of whom became his lifelong friend.

LECTURER AND PHILOSOPHER. Returning to America in 1833, Emerson began his lecturing career, and in 1835 was married, taking his wife to the spacious old house in Concord that was his home the rest of his life. His first published work, *Nature* (1836), sets forth more completely than any of the others, his system of philosophy. During the winters of 1835 and 1836 he delivered courses of lectures in Boston, which were well attended and appreciated, but his

Phi Beta Kappa oration, *The American Scholar*, delivered at Harvard in 1836, and his address before the graduating class of the divinity school at Cambridge in 1838 brought him before the world as a new and forceful personality. The former address was an earnest appeal for self-reliance and independence in American intellectual life, the latter, a plea for vitality and progress in religion. About the same time he became identified with the cause of anti-slavery and with certain political and educational reforms then greatly stirring New England thinkers, but his connection with reform of any sort was theoretical rather than practical, and he greatly disliked violence and fanaticism.

In the midst of his writing and lecturing Emerson was drawing about him a circle of New England writers and reformers, among the most prominent of whom were Margaret Fuller, Amos Bronson Alcott, Theodore Parker, William Henry Channing, James Freeman Clarke and Henry David Thoreau. The central figure of the interesting group of Transcendentalists (See TRANSCENDENTALISM), he was one of the first contributors and for a time editor of their short-lived organ, *The Dial*. In 1847 he visited Great Britain again, seeing his good friend Carlyle, lecturing to several appreciative audiences and making the acquaintance of Arthur Hugh Clough, Matthew Arnold and other men of letters. His impressions of this journey appeared in *English Traits*, published in 1856. Emerson's last years were passed in peace and honor at Concord. The burning of his house, rebuilt by popular subscription, was followed by a decline in health and strength, and a final tour abroad (1872-1873) did not restore him. Towards the end his memory failed him, but he remained always "beautiful in old age." His grave is near that of Hawthorne, in Sleepy Hollow cemetery.

ESSAYS AND POEMS. Emerson's works group themselves into two main classes, essays and poems, and just as the essays are a condensation of the materials of his lectures, so the poems are a more

condensed form of the essays. His prose style is essentially terse. A master of diction, his short, pithy sentences are so weighted with thought that they often have the effect of an epigram. His unsystematic method of composition, selecting a number of related ideas and rearranging them to form an essay, makes his essays brilliant in sentences, but lacking in coherence and harmony of structure. Emerson's poetry, like his prose, shows his lack of constructive genius. He was in feeling a great poet, but his knowledge and command of verse form were not sufficient to enable him to maintain a uniformly high level. At the same time he has written enough genuinely fine poems and passages to make him more than a minor poet. Such a nature poem as *The Rhodora*, the tender elegy *Threnody*, or the inspiring *Concord Hymn* are among the great poems of our literature.

EMERSON'S INFLUENCE. The 100th anniversary of Emerson's birth, recently celebrated, revealed how widespread is his influence at the present time. The source of his power is not so much the intellectual contents of his writings as their spirit and character. He stood for the sacred rights of the individual; self-reliance was his clarion call, and whether or not his readers accept his philosophy in detail, they must recognize his place among the great inspirers to noble ideals and conduct. Emerson's life was his best sermon. Sincere, gentle, gracious in manner, he attained the supreme excellence of character, that of a man who lived up to his ideals.

Emerson's writings comprise: *Nature*, 1836; *Essays*, 1841, 1844; *Representative Men*, 1850; *English Traits*, 1856; *The Conduct of Life*, 1860; *Society and Solitude*, 1870; *Letters and Social Aims*, 1876; *Poems*, 1876; *Lectures and Biographical Sketches*, 1883-1884; *Miscellanies*, 1883-84; *The Natural History of Intellect and Other Papers*, 1893.

Em'ery, an impure variety of corundum found chiefly in shapeless masses mixed with other minerals. It is a blackish or bluish-gray mixture containing

about 82 per cent of alumina and a small quantity of iron. Emery is nearly as hard as the diamond, is infusible and is not affected by acids. In a powdered or granulated form it is employed in cutting and polishing precious stones, and when glued to strong cloth or paper is used for a large variety of purposes, chiefly in polishing and cleaning metals. Incorporated in cement or baked in clay, it is employed in making emery wheels, laps, etc. As an abrasive, its cutting power is considerable, particularly when used in wheels revolving at a high velocity. See ABRASIVES.

Émigrés, *A"me"gra'*, the name applied to the Royalists, especially the nobles, who fled from France during the Revolution. The flight began soon after the storming of the Bastille. By the efforts of the Émigrés an army of 80,000 men gathered at Coblenz under the Duke of Brunswick, to receive the King when he crossed the boundaries of France, June 20, 1791. The King's attempt at flight failed, and when the Émigrés joined the Prussian army the French Government confiscated their property and sentenced many to death as traitors. After Napoleon became consul they were allowed to return, but by the charter of 1814 they lost all claim to their estates and to their old privileges.

Em'inent Domain', a term applied in law to the sovereign right of a government to appropriate private property to public uses whether the owner consents or not. Consideration of public welfare governs the exercise of this right, which may, for example, be used in procuring land for the construction of railroads, waterways and other public utilities. The Fifth Amendment of the Federal Constitution prohibits the exercise of this power without just compensation. If the agents of the corporation or government cannot agree with the owner on the question of compensation, then an impartial committee or a jury in court determines the amount to be paid.

In English law the doctrine of eminent domain is to be found in the prerogative right of the Crown to enter upon the

lands of subjects or to interfere with their enjoyment for the defense of the realm. No attempt, however, is made to exercise this prerogative, and lands are taken for State purposes by statute usually framed on the Land Clauses Acts.

Emin Pasha, A' meen Pa shah', (1840-1892), a German traveler, governor and naturalist, born at Oppeln, Silesia. His real name was Edward Schnitzer, and he was educated at the universities of Breslau, Berlin and Königsberg. At Berlin he received the degree of M. D. He lived in Turkey as a physician and about 1875 went to Khartum. In 1878 he was made governor of the equatorial provinces and was busy with schemes for the development of the country when the Mahdi rising cut off his communication. He held his post until he was relieved by Stanley in 1888. In 1890 he entered the service of his native country and while on an expedition to the Congo, he was assassinated by two Arabs.

Em'met, Robert (1778-1803), an Irish patriot. He attended Trinity College, Dublin, from which he was expelled when 20 for exciting rebellion. Thereupon he left Ireland for the Continent, but later returned home, with Napoleon's promise of aid in a struggle for Irish independence, and joined the Society of United Irishmen. In July, 1803, he was arrested and tried for leading the rebellion in which Lord Kilwarden perished. Though his own vindication is still considered a model of oratory.

Emory University, located in the suburbs of Atlanta, Ga., was established in 1914. Two of its schools had been in session many years prior to that time. The Emory College, located at Oxford, Ga., was founded in 1836. The Atlanta Medical College was founded in 1854. These two schools became units of Emory University.

In addition to the above mentioned schools, there are Schools of Law, of Theology, of Business Administration, and a Graduate School. The University runs on the quarter system and its enrollment for 1921-22 was 1159.

The physical plant consists of nine large permanent buildings of concrete and marble, two temporary buildings. In addition to this, the University has a teaching hospital in the heart of Atlanta with a capacity of over 200 beds, an out-patient department, well-equipped laboratories and a research hospital costing over \$1,250,000.00. The productive endowment of the University is \$2,250,000.00.

The University has a well-trained, efficient faculty of more than 175 men and maintains a high standard in all its schools.

Emo'tions, the complex feelings aroused by or connected with any state of consciousness. The simplest feelings begin with our existence, but the more complex ones which we call emotions require the presence both of sensations and of representative ideas which prolong and direct the sensation. Feelings, which arise from purely physical causes and are preceded or accompanied by no definite ideas, are, however, a part of all emotions. The pain from a blow and anger from the same cause illustrate the difference between a feeling and an emotion.

Many classifications of the emotions have been made. The most commonly used is that which separates them into three groups: the personal, or egoistic, emotions; the sympathetic, or altruistic, emotions; and the emotions of sentiment. The last group is subdivided into the intellectual, æsthetic and moral. The egoistic emotions are those which have to do only with one's self, as pride, anger, fear, etc. They are practically instinctive and inherited. The altruistic emotions, on the other hand, cluster about the welfare of others and, therefore, depend upon previous experiences. Altruistic emotions are developed later than egoistic emotions. Emotions of sentiment are also exceedingly complex. They depend upon memory, imagination, perception and thought, and comprise feelings of wonder, perplexity, remorse, love of beauty. They are altruistic and have an element of intellectuality.

Emotions are expressed by physical means, with which they are so closely related that the two cannot be separated.

The cultivation and the repression of the emotions are not so unimportant as it might seem nor are they easy of accomplishment. The egoistic emotions most frequently need repression. Anger, fear, pleasure, etc., in the young are apt to be expressed in violent outbreaks, which at first are rather easily subdued but later tend to become matters of habit. Every emotion rightly used has its purpose, and to wholly destroy an emotion is a dangerous undertaking. Children of highly emotional tendencies should be shielded from causes which excite emotions.

Altruistic emotions more frequently need stimulation and may be excited by the sight of objects or by circumstances which would tend to arouse them. Imitation is one of the chief factors in arousing the emotions, and it is hard indeed to excite in a child an emotion not shared by the teacher. For an excellent discussion of the emotions, consult Dr. Bain, *The Emotions and the Will*.

Empedocles, a Greek philosopher who flourished about the middle of the fifth century B. C., born of a distinguished family at Agrigentum, in Sicily. The ancients extolled him as a statesman, orator, physician, poet, philosopher and seer. He refused to be king, and helped to establish a democracy in his native city. His philosophical and ethical theories were expressed in two poems, of which large fragments have been preserved. His philosophy was an attempt to find a principle of the universe which should combine that of *being*, held by the Eleatics, and *becoming*, advocated by Heraclitus. This he did by assuming the existence of the four elements, earth, air, fire and water, which he was the first to postulate. These are changeless in themselves and independent of each other. They are mingled by the operation of two opposing forces which he calls friendship and strife, the one attracting them together, the other driving them apart. The ex-

isting universe is thus produced. The poems of Empedocles were greatly admired by Lucretius, who made them his model. See LUCRETIUS.

Em'pire. See GOVERNMENT, subhead *Monarchy*.

Empir'icism (from Greek *empeiria*, experience, trial), the philosophic doctrine that all knowledge and rules of conduct are derived from data furnished by the senses. It is opposed to rationalism or any doctrine of innate ideas. It regards the mind as originally an absolute blank (*tabula rasa*) on which sense-given impressions are mechanically recorded without creative activity on the part of the mind. Empiricism was characteristic of all the earliest Greek philosophers. In modern times it revived with Francis Bacon and was especially influential in England, appearing in the systems of Locke, Berkeley, Hume, Hartley, James Mill and John Stuart Mill. Empiricism fails to make of experience anything more than a piecemeal affair, *disjecta membra*. See PHILOSOPHY; RATIONALISM.

Employer's Liability. In most states there are laws requiring the employer to recompense his employees for injuries received by accident, and sustained when performing their duties, unless the accident is due to the employee's own negligence. The first Employer's Liability Act was passed by Parliament in 1880. Its purpose was to increase the employer's liability to his employees. Since then the introduction of complicated machinery and the organization of the present factory system have led to the enactment of more stringent laws, both in England and the United States. All these laws extend the liability to injuries received through the negligence of another employee whether superintendent, foreman or a fellow workman. In several states there are laws requiring dangerous machinery to be covered or enclosed by suitable guards. These laws have led to a new form of insurance in favor of the employer. For a specified premium the insurer agrees to pay all damages arising from accident to his

employees for the time specified, or so long as they are engaged in the construction of a special work, such as a bridge or a building.

Empo'ria, Kan., a city and the county seat of Lyon Co., 61 m. s.w. of Topeka, on the Neosho and the Cottonwood River, and on the A. T. & S. Fe, the M. K. & T. railroads. Emporia is surrounded by a fertile farming region, of which it is the commercial center, and has, among other industrial establishments, flour mills, foundries, machine shops and several wholesale houses. At Emporia are located a state normal school, the College



EMU

of Emporia (a Presbyterian institution, opened in 1883); and the Western Musical Conservatory. There is a fine government building here, also a beautiful library building, the latter the gift of Andrew Carnegie. Emporia is known as the birthplace of William Allen White, the author. Settled in 1856, Emporia was chartered as a city in 1870. Population in 1920, 11,273.

E'mu, a bird of the Ostrich Family, living in Australia. This bird stands five feet high and is brown, mottled with

gray. The legs and neck are long; the wings are rudimentary, and these birds cannot fly. The feathers are hairlike and are much used in commerce, and the skin is prized for an oil which it contains. The dark-greenish eggs, to the number of 7 to 18, are laid on the ground, or sometimes at the base of a tree, in which case a platform about four feet long and two and one-half feet wide is made of grass, sticks, leaves, etc. The young are grayish-white with black stripes on the back and sides. The emus live mostly in the open country and, like the ostrich, are very swift of foot.

Enam'el, the name given to a glass-like glaze of various compositions, applied in the form of a thickened liquid or paste to the surface of metals and of clay products. One method is to apply it with a brush and place the article so treated in an oven where the enamel is fixed by heat. When used on bricks and pottery, these articles are put in kilns where the glaze is burnt in. The basis of enamel is a composition which is easily melted and forms a colorless glass. To this base are added such colors as are desired. See GLASS; POTTERY.

Ency'clope'dia, or Cy'clope'dia, a book or set of books designed to discuss the various departments of human knowledge. The first systematic works of this kind were French volumes brought out in the middle of the 17th century. The first English encyclopedia was published in 1704, and the well-known work by Chambers appeared in 1728. The *Encyclopædia Britannica*, now issued in its 11th edition, was the first of a new order of encyclopedias aiming to give more extensive articles; its first edition was published in 1768. The largest work of this sort is a Chinese encyclopedia of 5040 volumes.

En'dicott, John (1588?-1665), a founder and the first governor of Massachusetts Bay Colony, born in Dorchester, England. With 60 Puritans he landed at Salem in 1628. He governed the colony during 1629, 1644, 1649 and, barring 1654, annually from 1651 till

his death. He was responsible for the colonial mint of 1652. Of rigid and fiery zeal, of great independence in act and thought, he believed in the theories of Roger Williams. See WILLIAMS, ROGER.

Endless Screw. See SCREW.

Endymion, *En dim'i un*, in mythology, a beautiful shepherd who pastured his flocks on Mt. Latmos and was there seen and loved by Selene, the moon goddess. The usual story is that Endymion was kept asleep by Selene that she might enjoy his society undisturbed. Another story is that Zeus conferred upon him the gift of eternal youth by giving him also the gift of eternal slumber; while he slept Selene cared for his flocks, increased them and saw that no harm befell them. Still another story says that this endless sleep was a punishment for Endymion's presumption in falling in love with Hera, or Juno. Endymion typifies the dreaming poet, whose life consists more of shadows and visions than of practical realities. Keats's fanciful poem *Endymion* deals with this story.

En'emy, in international law, a nation at war with another, or a body of men or an individual belonging to a nation at war with another. According to international law two states do not assume the status of enemies until war is declared between them, however strained their relations may become. Enemies are classed as combatants and noncombatants. Combatants are those actively engaged in the war, whether they are members of the military force or of the civil government. It is the purpose of the hostile state to overpower enemies of this class. Noncombatants are those engaged in peaceful pursuits, and according to the rules of modern warfare noncombatants are exempt from hostile attack, though they may suffer loss of property as the result of the invasion or the passage of an army over the locality. See WAR.

En'ergy, the power to overcome resistance, or the ability to do work. It is commonly divided into two classes: potential energy, which a body has by virtue of its position, as, a tightly-coiled

spring, or water at high level; and kinetic energy, which a body has by virtue of its motion, as that possessed by a stone thrown into the air. Energy is changed from one form to another, as, when the stone in its flight reaches the highest point and begins to fall, its kinetic energy has been transformed to potential energy, to be again transformed into kinetic energy as the stone falls. Energy is also transmitted from one body to another. Machines are devices whose purpose is to transfer energy from one body to another or to transform it from one kind to another. They do not create energy but only make it more usable. See ENERGY, CONSERVATION OF.

Energy, Conservation of, the quality of energy whereby it may be changed from one form to another but is never lost. The great total of energy is never increased or diminished but is always the same in quantity. When a certain amount of energy is communicated to a machine, the full amount of work equivalent to the energy used is not returned. This seemingly lost energy is greatly due to friction, but since the overcoming of friction produces heat, the lost energy has reappeared in a new form. The vegetables which we eat have a potential energy, which they have received from the sun and which they turn over to us as muscular energy. When a hot object gradually cools, the heat is being given off to everything about it and all bodies finally reach the same low temperature; the energy is then said to be dissipated and is of no use to man in performing work. Though the total energy in the universe remains constant, that available to man is gradually decreasing.

En'field, Conn., a town of Hartford Co., 18 m. n. of Hartford, on the Connecticut River and on two divisions of the New York, New Haven & Hartford Railroad. There are steam brickworks, powder mills and manufactories, metal goods, undertakers' supplies. The largest carpet mill in the world is located here. The town is the center of tobacco-growing interests, and a large amount of

tobacco is prepared for use and shipped to all parts of the world. The population in 1920, U. S. Census, 11,719.

En'gineer'ing, broadly speaking, the science by which matter is made useful to man. The term originated in connection with the running of engines and formerly referred only to the profession now known as mechanical engineering. The first engineering feats, however, were rather of structural and military character, as witnessed by the Pyramids and the ruins of bridges, roadways and military camps. With the advance of science and invention the field of engineering became so large that it was divided into numerous departments, each of which is considered a separate profession. Among these are: civil engineering, which includes the construction and maintenance of such public works as roads, bridges, lighthouses, breakwaters, etc.; mining engineering, the locating and securing of ores; electrical engineering, the transmission and utilization of electrical power; hydraulic engineering, the use of water power; and mechanical engineering, dealing with the construction and operation of machinery. Other branches, whose names imply what work is included, are: aerial, chemical, gas, irrigation, army, agricultural, sanitary and marine engineering.

England, *In' gland*, the name applied to the southern portion of the Island of Great Britain, exclusive of Wales, the ancient historical division of the western coast. It lies between 50° and $55^{\circ} 46'$ north latitude and $1^{\circ} 46'$ east and $5^{\circ} 42'$ west longitude, and is bounded on the n. by Scotland, on the e. by the North Sea, on the s. by the English Channel and on the w. by St. George's Channel and the Irish Sea. Its shape is triangular and it has a total area of 50,680 sq. m. The coast line is greatly indented and is nearly 2000 m. long; no point of the mainland is more than 75 m. from the sea.

SURFACE. The part of England lying northwest of the line from Exeter to Berwick is hilly and mountainous, but the mountains are, on the whole, lower

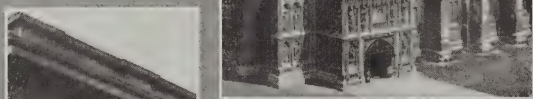
than are those of Scotland. The ranges extend generally from northeast to southwest, and the southern part of the island becomes gradually wider, lower and flatter. The Cheviot Hills belong rather to Scotland than to England and formed the natural line of division which established the separate political existence of the two countries. The Pennine Chain, a continuation of the Cheviot Hills, stretches southward for 270 m., until in Derby and Stafford it becomes an elevated moorland plateau. Other connecting ranges of the country are the Cumbrian Range, the Cambrian Range, the Devonian Range, the Mendip, Cotswold and Chiltern hills.

The most extensive plains are the Coquet, Tyne and Tees valleys in the northeast; the Valley of Eden, between the Pennine Chain and the Cumbrian Range; the Vale of York in the north, with an area of almost 1000 sq. m.; and the Cheshire Plain, in south Lancashire and Cheshire. The Salisbury Plain lies southeast of the Cotswold Hills; the Vale of Taunton is in Somerset and that of Exeter in Devon; the continuous plains of Sussex, Kent and Surrey end to the southeast in the Romney Marsh. The whole southeastern portion of the country is more or less lowland.

RIVERS AND LAKES. There are numerous large and important rivers, and the four great river basins are those of the Thames, Severn, Humber and Wash. The basin of the Thames has an area of 6160 sq. m. and extends east and west for 130 m. The Severn has as important tributaries the Upper Avon, the Teme and the Wye, and the area of its basin is 8580 sq. m. The tributaries of the Wash are the Great Ouse, Witham, Nen and Welland. The Humber receives the waters of the Ouse and the Trent and drains 9550 sq. m. of English and Welsh territory. Smaller streams are the Tyne, Wear, Tees, Eden, Mersey, Ribble and Dee. The lakes which lie between the mountain ranges of the north and form the celebrated "Lake District" are principally Windermere, Conistone Lake, Derwent Water and Ullswater. For beauty



ENGLAND. (1) House of Parliament. (2) Typical country home, Period of Henry VIII. (3) Royal Exchange, London. (4) Windsor Castle; St. George's Chapel. (5) Windsor Castle, first court.



ENGLISH ARCHITECTURE. (1) Canterbury Cathedral. (2) Hampton Court, London. (3) British Museum. (4) Crusader's Tomb, Westminster Abbey. (5) St. Paul's Cathedral.

and picturesqueness they are scarcely surpassed by the famous lochs that curve along the hillsides and highlands of Scotland.

CLIMATE. The British climate as a whole is characterized by cool summers, warm winters and an abundant supply of rainfall. The surrounding seas are warm and temper the climate of the islands, preventing marked extremes of temperature. Clouds and heavy fog hang over the country when the wind sweeps in from the Atlantic; it brings heavy rainfall to the western coasts, which lessens materially inland, but not sufficient to bring about an inadequate supply at any time of the year. There is abundant snowfall in the winter, and during the summer months the islands are exposed to severe cyclonic storms from the Atlantic.

MINERALS AND MINING. Coal and iron have been found in such abundant quantities in England as to make it the foremost among European countries in industrial development. The large coal fields, especially, have determined the distribution of population and have long been the source of the great wealth of the country. The mines were exploited to a large extent even in the 13th century, and the recent change in the relative importance of the mines of Great Britain is due only to the fact that the United States and Germany have exploited wider fields that are constantly yielding richer returns. Today the output of the British iron mines is insufficient for local needs and the manufacturing interests depend largely on imports from Spain. During the Middle Ages and before, other minerals were considered of far greater importance, and a heavy trade was carried on in tin, lead, copper and silver, despite the fact that the mining was carried on with great difficulty. Minor products which are now obtained are English clays, copper, tin, salt, limestone, slate, slab and sandstone.

AGRICULTURE AND FISHERIES. The natural facilities for agriculture are inferior to those of the large countries on

the Continent, and England far from supplies a sufficient amount to meet its own needs. The relatively small part of the country that is suitable for cultivation lacks any high degree of fertility, and, while the summers are generally temperate, they are on the whole too cool for a successful growing of corn. There has of late been an increased productivity of wheat, and the large population makes heavy demands on the fruit and truck farms which exist in large numbers near the large cities. Grazing is of great consequence and dairying is constantly coming to the front among the industries. The principal cereals are wheat, barley, oats, rye, beans and peas; the vegetables include potatoes, turnips and cabbage. Clover, hops, flax and small fruit are also raised. The size of the English farms is comparatively small, but a large outlay of labor and capital is necessary for the successful methods of intensive farming that are widely resorted to.

The fisheries, particularly off the Norfolk coast, are very profitable. The most important catch is the haddock, while the North Sea yields rich returns of codfish, shellfish and mackerel. Other fish are the oyster, sardine and salmon. Yarmouth, Hull, Peterhead and Grimsby have within recent years developed into large fishing centers, and the catch is mainly sent to the London market—the largest fish market in the world.

MANUFACTURES. For a long time England has enjoyed the reputation of being the foremost manufacturing country in the world, and it is only within the last 100 years that the United States equaled and surpassed Great Britain in industrial development. Its early chief claim to preeminence was in its unexcelled production of wool, and the establishment of a home woolen industry is attributed to Edward III, who imported numerous Flemish artisans to England and with this migration established the nucleus to the production. During the Elizabethan reign it was still further developed, due to the additional migration of Flemings, persecuted in their Mother Country.

With the arrival of the French Huguenots after the revocation of the Edict of Nantes, a new impetus was given to the manufacture of paper, silk and glass. The Industrial Revolution of the 18th century witnessed a still greater development, and almost every branch of the manufacturing industry was in some way affected by the remarkable inventions of the age. The processes of the weaving industry and the manufacture of iron were almost totally revolutionized. With the introduction of steam power it was no longer necessary for the great industries to locate upon water-courses and thus the manufacturing interests spread widely over the entire country. Cotton had surpassed wool by the middle of the 19th century, and Lancashire is now the great center of that industry. The brewing industry is important, as also is the manufacture of machines and metalware in northern England. The industrial history of modern England has been largely one of readjustment of the social and political life of the laboring classes and a fuller recognition of the rights of labor.

COMMERCE AND TRANSPORTATION. The aim of England has always been commercial supremacy and an effort to establish trade on a secure foundation. To this end the country has directed all its energies to secure colonial expansion and the establishment of naval supremacy. Natural conditions have been largely in its favor, and its strategic central position made it an important connecting point between Continental trade and trade beyond the seas. Before the reign of Queen Elizabeth, however, the trade was primarily in foreign hands, but with the establishment of large commercial companies—the East India, Levant, Bermuda, Hudson's Bay and the Virginia—all this was changed. Imports are now increasing more rapidly than exports; in imports Great Britain leads the world by half; it is a close rival of the United States, however, in export trade. Cotton and woolen goods lead the exports; the imports are metals, wheat, corn, tea and gold.

England is now a network of canals, of which the largest is the Manchester Ship Canal, completed in 1894. Others are the Gloucester, Exeter and Berkeley, and the rivers Severn, Thames, Weaver and Aire have been canalized. Great importance has been attached to these inland waterways, which have not to any large extent been superseded by the recent heavy railroad construction. Road making has been improved through the methods effected by McAdam and Telford, and the roads which are now controlled by rural district councils are no longer subject to tolls. Eleven large railway companies practically control the mileage of the country, which in 1905 exceeded 22,846 for the United Kingdom. For a short time the tramways fell into disuse with the rapid development of the railway system, but they have been reinstated, modeled upon the American system. They are not, however, used to such a large extent in the cities as are carriages and cabs.

EDUCATION AND RELIGION. Provisions for a public school system were not made in England and Wales until the beginning of the 19th century. The Elementary Education Act, passed in 1870, now forms the basis of the educational system of the country, although it has been modified by the Education Act of 1902 (See EDUCATION, NATIONAL SYSTEMS OF, subhead *Great Britain*). There is an established State Church of England, which in membership leads the dissenting churches by a slight majority. Its faith is the Protestant Episcopal. Throughout Great Britain there are large numbers of Roman Catholics, Methodists, Baptists, Presbyterians, Congregationalists, Hebrews, etc.

POPULATION. The density of population in England is estimated at 606 inhabitants to the square mile. In 1911 the population, including Wales, was 36,075,269. There has been of late a decrease in the birth rate and the death rate, but a marked increase in immigration, chiefly from other parts of the kingdom. The emigration is principally to the United States. A larger per cent



of the urban population is found in England than in any other country.

CITIES. The large cities of England include London (the capital), Liverpool, Manchester, Birmingham, Leeds, Sheffield, Bristol, Bradford, Leicester, Portsmouth and Brighton, all with a population of over 120,000.

HISTORY. Cæsar invaded Britain in 55 B. C., and the island was annexed to the Roman Empire during the reign of Claudius in 43 A. D. and finally reduced by Agricola in 80 A. D. The Romans introduced Christianity, built roads and civilized the country, especially in the southern part. The next invaders of England, who were chiefly from Denmark, were the Angles, Saxons and Jutes. From the first two we have the term *Anglo-Saxon*, while the Angles gave their name to the country; Angleland became later abbreviated to England. In 595 Christianity was again introduced by St. Augustine, and 90 years later the old religion had passed away. This brought the land in touch with the civilization of the Continent and the Church of Rome. For centuries the land was divided into many petty kingdoms, but in 827 Egbert succeeded in holding a large part of the country. The Danes began their invasions a little later and for 200 years they fought for control. At last Alfred the Great drove them north of a line running from London to Chester and forced Christianity upon them. Canute, a Danish king, gained the power in 1017, but the Saxon line was restored later and maintained until the Norman Conquest in 1066. See **HASTINGS, BATTLE OF.**

Norman kings ruled the land for 69 years. This conquest enlarged the industrial life by the coming of many foreigners with new trades, while the somewhat stolid Saxon character was enriched by union with the brilliant and versatile Norman.

Henry II (1154-1189), the first of the Plantagenet line, reformed the royal courts. He made trial by jury the law of the land, and the decisions of his judges became the basis of the English

common law. The rising power of the barons wrested the Magna Charta from John in 1215 (See **MAGNA CHARTA**). Simon de Montfort led a successful rebellion of the barons against Henry III, and later, in 1265, his reforms led to the entrance of the commons into the government. During the reign of Edward I (1274-1307) Wales was joined to England and the long struggle with Scotland began. At the Battle of Bannockburn, during the reign of his son, Edward II (1307-1327), the Scots won their independence (See **WALLACE, SIR WILLIAM; BRUCE, ROBERT.**)

Edward III laid claim to the throne of France by inheritance through his mother, and won brilliant but fruitless victories on French soil (See **HUNDRED YEARS' WAR**). These wars united the Normans and Saxons into one people, the English. Another great advantage gained was that the power of Parliament was increased, as Edward granted constitutional rights in return for the means to carry on his wars. Richard II (1327-1399), a weak king, was deposed and gave way to Henry IV (1399-1413), first of the line of Lancaster, whose reign was marked by great advancement in constitutional government. Henry V (1413-1422), his son, carried on the war with France so successfully that he forced the French to sign a treaty wherein he was recognized as the successor of the mad King Charles VI. Henry died while still a young man, and the French, aroused by Joan of Arc, drove the English from the country (See **JOAN OF ARC**).

The long war called the Wars of the Roses began in the reign of Henry VI (1422-1461), a weak king, who was deposed. Edward IV (1461-1483), first of the House of York, succeeded him. Soon after his death Richard III (1483-1485) usurped the throne and was defeated in the Battle of Bosworth by the Earl of Richmond, who reigned as Henry VII (1485-1509). The ruin and extinction of many noble families by the wars left the King almost free rein in government, and the Tudor sovereigns,

of whom he was the first, were practically absolute rulers.

Henry VIII (1509-1547), his son, favored the new learning (See RENAISSANCE), and precipitated the Reformation in England (See REFORMATION, THE). He declared himself head of the Church of England because the Pope refused to grant him a divorce from his first wife, Catharine of Aragon, but he left the doctrines untouched. He wisely, though rather unwillingly, followed the advice of his minister, Cardinal Wolsey, in the still modern policy of not interfering in European affairs except to maintain a balance of power. The doctrines of the Reformation gained ground during the reign of Edward VI (1547-1553), but there was a Catholic reaction under his sister, Mary (1553-1558).

When Elizabeth (1558-1603), daughter of Henry VIII and Anne Boleyn, came to the throne, she was supported by the Protestants. She endeavored to secure uniformity of worship, with herself as the head of the Church of England. The defeat of the Armada, a fleet sent by Philip II of Spain to reduce England to papal submission, strengthened the Protestant cause and increased the growing sense of nationality. This was the golden age of English literature, while English adventurers, who were half pirates, half patriots, explored the seas. Ireland was wholly subdued during Elizabeth's reign. See ELIZABETH; MARY STUART; SPANISH ARMADA, THE.

James VI of Scotland succeeded Elizabeth as James I of England (1603-1625). He was the son of Mary Queen of Scots. Although the crowns of the two countries were united, each country continued to have its own legislative body. James I had much trouble in his attempt to rule without regard to constitutional law. The contest grew even more bitter between his son, Charles I (1625-1649) and Parliament, until it flamed forth into civil war (See CHARLES I). He was defeated, convicted of treason and executed in 1649. By 1653 Oliver Cromwell had made himself lord protector, and

under his firm rule England had peace within, while she won the respect of the nations of Europe (See CROMWELL, OLIVER). Cromwell's son, Richard, was not fitted to rule and had no liking for the task. Six months after Cromwell's death Charles II (1660-1685), son of Charles I, was recalled and received an enthusiastic welcome from the English people. He shamefully received money from the French king, dragging England down from the high place which she had held under Cromwell to that of a mere satellite of France. His corrupt court and dissolute life were overlooked in the general joy of possessing a king of the old line once more. His brother, James II (1685-1688), was a Catholic, and his arbitrary rule, with his efforts to establish his faith, led the people to rise in revolt and drive him from the kingdom. His daughter Mary and her husband, William of Orange (1689-1702), were invited to rule and were crowned after they had signed the famous Bill of Rights (See BILL OF RIGHTS). Constitutional government made further progress by a law making the king's ministers responsible to Parliament. William of Orange did effectual work in thwarting the ambitious scheme of Louis XIV. Mary's sister Anne (1702-1714) had a reign brilliant with military victories gained by Marlborough in the War of the Spanish Succession. In 1707 the legislatures of England and Scotland were united.

The further history of England is treated in the article GREAT BRITAIN.

England, Bank of. See BANKS AND BANKING, subhead *Bank of England*.

England, Church of, the State Church of England. At the time of the Reformation England was one of the countries of Europe which severed its allegiance to the Papacy, Henry VIII being the first sovereign to establish his position as supreme head of the Church (See HENRY VIII). Protestantism was definitely established in the reign of Elizabeth, and the acts of Supremacy and Uniformity (1559), passed by Parliament, reasserted the independence of the

Church of England. In 1563, the Thirty-nine Articles, containing the doctrinal points of the Church, were ratified by a convocation held in London under Archbishop Parker. These Articles have since then been the authoritative teaching of the English Church. A certain latitude of belief, however, exists among the body of the Church, and three sections have resulted from differences in doctrine, known as High, Low and Broad Church parties. The Church of England is episcopal in administration. There are two archbishops, of Canterbury and York, and under these are the bishops, archdeacons, deans, canons, prebendaries, rectors, vicars and curates. The Archbishop of Canterbury is entitled Primate of all England. The Church maintains countless missionary enterprises, both at home and abroad.

Englewood, En' g'l wood, N. J., a city of Bergen Co., 14 m. n. of New York City, 13 m. from Jersey City and 1 m. from the Palisades of the Hudson, on a branch of the Erie Railroad. It is a beautiful residential city and has fine parks, drives etc. The public school system is modern and excellent. There are but few industries. Englewood was incorporated as a city in 1895, but, the act of incorporation having been declared unconstitutional, was reincorporated in 1899. Population in 1920, 11,627.

English Channel, an arm of the North Atlantic Ocean, separating England from France, and connected with the North Sea by the Strait of Dover. It is from 20 to 140 m. wide and has an average depth of about 200 ft. The bottom is covered with coarse gravel. It contains the Isle of Wight, Channel Islands, the Scilly Isles and many smaller rocks and islets. The Seine is the principal river whose waters fall into it. The chief ports are Dover, Southampton, Brighton, Havre, Boulogne, Dieppe and Calais.

English Language. See LANGUAGE, subhead *English Language*.

English Robin. See ROBIN RED-BREAST.

Engra'ving, the art of graving or

cutting marks or figures upon any hard substance. Engraving for ornamental purposes upon metal, engraved writing upon tablets, gem engraving for making signets and cameo engraving are all old forms of the art. In a special sense the term *engraving* is understood to mean the cutting of designs, pictures, etc., upon blocks of wood or metal plates for the purpose of printing impressions from them. This character of engraving is divided into two sorts, one upon metal, in which the lines to be printed are sunk in, and engraving on wood, in which the lines to be printed stand in relief. Printing from blocks of wood is said to have originated with the Chinese in the tenth century, while printing from engraved plates of metal was discovered in the 15th century by an Italian, and later introduced into most of the European countries. Copper was the metal most commonly used, but during the 19th century steel was frequently substituted on account of its hardness, which allowed a larger number of impressions being taken from it. Steel is more difficult to engrave than copper, and, unless properly done by an experienced artist, does not produce as good results. Copperplates can be coated with a film of steel by a modified electroplating process.

The main tool used in line engraving is the graver, or burin, a small bar of steel pointed at one end, with a round, wooden handle fixed to the other end. This instrument is held between the engraver's forefinger and thumb, and is pushed forward by the pressure of the palm on the handle and made to cut into the metal plate. The depth and breadth of the lines depend upon the pressure exerted and the angle at which the burin is held. Wood engravings are made from blocks of Turkish boxwood, and they are polished and finished on one side and covered with flake white, which gives a drawing surface on which the design is either drawn, photographed or transferred. The graver for cutting the lines in wood engraving is similar to that used by the engraver on metal plates, but many different kinds of knives are

used to cut away those parts of the wood block not in relief. It is usual to take electrotypes of woodcuts and save the original engraved block to make other electrotypes from, at different times, as they wear out in printing. Many photomechanical processes and etching methods have revolutionized the engraver's art, so that wood engraving is but little practiced now. See ETCHING; HALFTONE; PHOTO-ENGRAVING; LITHOGRAPHY.

E'nid, Okla., a business center and the county seat of Garfield Co., situated in the north-central part of the state on Skeleton Creek, a branch of the Cimarron River, and on the Chicago, Rock Island & Pacific and other railways, 45 m. n. w. of Guthrie and about 70 m. n. w. of Oklahoma City. During the development of Oklahoma Enid has grown rapidly and has become an important trading point. Its industrial plants include foundries, tile works, lumber and flour mills and bottling works. It is situated in the midst of a fertile agricultural and stock-raising region and forms a shipping point for stock and farm produce. Natural gas has recently been discovered in the vicinity of the city. The Oklahoma Christian University, a coeducational school, is located here. Enid was founded in 1893 and became a city the same year. Population in 1920, U. S. Census, 16,576.

Enn'ius, Quintus (239-169 B. C.), one of the early Roman poets, probably of Greek extraction, born at Rudia, in Calabria. At about the age of 38 he came to Rome, where he supported himself by teaching Greek language and literature in the homes of certain distinguished families. He wrote tragedies, comedies, satires and a series of narrative poems in 18 books, entitled *Annales*, only fragments of which are extant. The poetry of Ennius is distinguished by energy and spirit rather than finish of style. He first brought hexameter verse to the attention of the Romans, and through his work the Latin language became improved in grammatical forms and more copious and powerful.

Ensign, En'sine, the lowest rank among commissioned officers of the navy. The ensign in the navy corresponds in rank with second lieutenant in the army, and is next below master. The term *ensign* is also applied to the national flag in the American navy. See NAVY; ARMY; LIEUTENANT.

En'silage or Si'lage, a green fodder preserved in an air-tight pit or compartment for winter use. The building or compartment so used is known as a silo. Fodder thus preserved has the advantages of furnishing green rations for stock during the entire year, preserving in small space a greater quantity of food than could be saved by drying, diminishing the expense and making use of crops, such as weeds, horse beans, etc., that would not be of use dried. Silage also can be made in weather unfit for curing of hay. The crops usually made use of for ensilage are corn, clover, millet, sorghum, peas, alfalfa, soy beans and small grains; corn is the one chiefly used in the United States. For the purpose of ensilage it is generally cut into half-inch lengths or shredded, although occasionally it is preserved whole. Two or three feet of ensilage are put in during a day; this is allowed to heat and settle a day or two before the next is put in. When the silo is full, water is put on in the ratio of ten quarts to every square foot of surface. This causes the fodder at the top to rot thoroughly and forms a covering which effectively protects that underneath.

The process of fermentation that takes place has been found to be due to physiological changes in the plant cells and not to a bacterium, as was once supposed. Ensilage is particularly valuable for dairy cows, and feeding may be begun as soon as the silo is filled. Sheep and horses also thrive upon it, but for swine and beef cattle it is not considered especially good. Ensilage was introduced into the United States from France in 1875 by Manly Miles of Michigan, and his book, *Silos, Ensilage and Silage*, is still practical. The following bulletins are also helpful: *United*

States Department of Agriculture Farmers' Bulletin 32; Wisconsin Experiment Station Bulletin 83; Indiana Experiment Station Bulletin 40; Oregon Experiment Station Bulletin 67. See SILO.

Entail', in law, the settlement or conveyance of an estate whereby the legal course of inheritance or succession is cut off by excluding one or more of the heirs and settling the estate upon a particular heir and his descendants. The custom of entail probably originated with the Romans, and during the time of the later emperors the custom of settling land upon a series of heirs was common and had legal sanction. It is probable that it was from the Romans that the Scottish lawyers obtained their idea of entailing the estate upon the eldest son, who also succeeded to the office and title of his father, though the law of primogeniture was not recognized among the Romans. Entail forbids the alienation of the estate from the family and makes it hereditary. Entail has been abolished by law in most of the states of the Union.

En'velope, a name given chiefly to paper pockets, or coverings, for enclosing letters. Envelopes are usually sealed by means of a flap, faced with mucilage and sometimes by sealing wax. In making them, dies are used to stamp out the paper into the required shape; these forms are then folded and gummed by automatic machines. The manufacture of envelopes is an important industry, millions being used every year. The United States Government manufactures envelopes upon which postage stamps are printed. These envelopes can be obtained at post offices and of rural mail carriers.

En'voy-Extraor'dinary. See DIPLOMACY.

Epam'inon'das (about 418-362 B. C.), a Theban leader, one of the noblest and purest characters in history. He was a moving spirit in the struggle which destroyed Spartan supremacy in Greece and secured the temporary ascendancy of Thebes. At the battle of Leuctra (371 B. C.) he employed tactics

of his own invention, later revived by Napoleon. He was mortally wounded in the hour of victory at Mantinea. On one occasion his enemies elected him city scavenger, which office he accepted, saying: "I will compel the office to reflect honor upon me by a faithful discharge of its duties."

Ephesians, *E fe'zhahns*, Epistle to the. See PAULINE EPISTLES.

Ephesus, *Ef'e sus*, one of the 12 Ionic cities of Asia Minor, situated in Lydia, near the mouth of the Cayster River. It is supposed to have been founded by Androcles, the last King of Athens, but its early history is largely surrounded in myth and legend. Following the reign of Alexander the Great the city prospered greatly, and under the Romans it was made the capital of the Province of Asia. It was the headquarters of St. Paul and the Apostle John and early became the seat of a vigorous Christian Church. In 263 A. D. the Goths destroyed its temple, a blow from which the city never fully recovered. Since 1896 systematic attempts at exploration and excavation of the city have been carried on and numerous discoveries have laid bare the plan and ancient splendors of the city.

Ep'ic. See POETRY, subhead *Epic Poetry*.

Ep'icte'tus (about 60-?), a celebrated Stoic philosopher, born at Hierapolis in Phrygia. In boyhood he was a slave of one of Nero's freedmen in Rome, but afterwards secured his liberty. He attended Stoic lectures and nominally accepted this philosophy; but his interest in it was of a practical rather than a speculative nature. In the year 90 he was banished from Rome, along with other philosophers, by the Emperor Domitian, who feared the opposition of the Stoics. The remainder of his life was spent at Nicopolis, in Greece, near where the Battle of Actium was fought. His teachings exhibit a high type of morality and inculcate a noble righteousness. At times they approach the moral doctrines of Christianity. Epictetus wrote nothing himself, but his teachings

were recorded by his pupil Arrian, in a work entitled *Handbook* and in eight commentaries, four of which have been lost. See STOICISM.

Ep"icure'anism, the name of a school of philosophy founded in Athens by Epicurus near the close of the fourth century B. C. It is not so much a philosophy as a theory of life, for, while it had a philosophy of nature and of truth, these were almost wholly subordinated to its system of ethics. The central tenet of this system was that man's chief end is the attainment of pleasure. Pleasure is not to be interpreted, however, as a sensuous and temporary affair; and in this is shown the chief advance of Epicureanism over the teaching of the Cyrenaics. *True* pleasure is to be sought, not merely for the present, but for the whole life. The pleasures of the soul, therefore, memory and hope, and a happy and tranquil mind are to be preferred to those of the body. Virtue, while not an end in itself, is an indispensable element in true happiness. Nor should the pleasure of life be dimmed by the fear of death; for, while we live, death is not, and when we die, we are not. There is no immortality.

The Epicureans in Athens were bound together by the closest bonds of friendship and greatly emphasized the social aspects of life. As a distinct school the system flourished until the fourth century A. D. and still continues to be felt in modern Hedonism and in the widespread popular importance attached to happiness as the chief aim of life. See CYRENAICS; EPICURUS; HEDONISM.

Ep"icu'rus (342-270 B. C.), a Greek philosopher, founder of the Epicurean School, born on the Island of Samos. He went to Athens in 323 B. C. and from there to Colophon, where he assisted his father, who was a teacher. Afterward he taught grammar and, later, philosophy in Mitylene and Lampsacus. About 306 B. C. he returned to Athens, and prepared the garden that became famous as the seat of his school of philosophy. His followers were often called "The Philosophers of the Garden."

While Epicurus taught that pleasure is the chief good, he and his immediate disciples lived simple, frugal lives and sought the higher forms of pleasure, believing that such gave greater enjoyment in the end. Over the gate to the garden was the inscription, "Only barley cakes and water served here." He was very successful. Pupils flocked to sit at his feet from Greece and Asia Minor; and his philosophy was received, without his definition of pleasure, however, by distinguished citizens of Rome. He is said to have written about 300 volumes on natural philosophy and other subjects; but there remain only some letters and fragments. We are dependent for our knowledge of his teaching upon the writings of Cicero, Plutarch and Lucretius. See EPICUREANISM.

Ep'ilep'sy, or **Falling Sickness**, is a deranged condition of the nervous system, manifested in intermittent attacks or seizures, which take the patient suddenly and without warning. It is characterized by insensibility, usually with convulsions, difficult or arrested breathing and frothing of the mouth. Appearances accompanying the attacks are alarming, but there is usually little danger. The patient should be prevented from injuring himself in any way, and placed as soon as possible in a recumbent position, with head slightly raised and clothing loosened about the neck. In some of the milder forms there is little outward sign of illness. No permanent cure for epilepsy has been discovered. The patient may live to old age, however, and spend an active life. It has been found that many criminal acts following epileptic attacks have been automatically performed as the result of uncontrollable impulses due to the effects of the disease.

Epiphany, *E pif' a ny*, **Feast of the**, a Roman Catholic feast celebrated on the sixth of January, as a commemoration of Christ's manifestation to the Gentiles in the persons of the Wise Men. It is sometimes called "Little Christmas," and was a favorite occasion for staging miracle and morality plays in the Middle Ages.

Epi'rus, an ancient country in the northwestern part of Greece, now forming the southern portion of Albania. In it was the city of Dodona, where the famous oracle of Zeus was located. Pyrrhus, one of the great military kings, became a leader of the Hellenic states and won some notable victories against the Romans. Epirus, as a separate kingdom, disappeared from history in 146 B. C., when it became a province of Macedonia.

Epis'copa'lians, a religious sect whose Church is known as the Protestant Episcopal Church of America. This Church is the descendant of the Church of England, and has existed as a separate American body since 1789, when the constitution was adopted in Philadelphia. The movement to unite the various organizations owing allegiance to the English Church began in 1784, and the work of the General Convention of 1789 was the culmination of much preparation and deliberation. In organization and belief the Episcopal Church in America is closely akin to the Church of England, and, as in the latter Church, in the Episcopal Church there is the High and the Low Church party. The former is, in America, the more influential. In legislative matters the General Convention is supreme. This body, composed of the House of Bishops and the House of Clerical and Lay Deputies, meets every three years. Each diocese holds an annual convention, which legislates for the internal affairs of the diocese. Among the numerous activities of the Church are 18 sisterhoods, missionary societies, the Brotherhood of St. Andrew, the Daughters of the King and many hospitals and colleges. In 1918 the Protestant Episcopal Church reported 5286 clergymen, 8,200 churches and 1,083,366 communicants. See ENGLAND, CHURCH OF; REFORMED EPISCOPAL CHURCH.

Epistles, Pauline. See PAULINE EPISTLES.

Epsom Salt, a white crystalline solid composed of magnesium, sulphur and oxygen and chemically known as hydrous magnesium sulphate. Its name is derived from the town of Epsom, Eng-

land, where it was prepared from the mineral waters. It is found in the crystalline state in the cave region of Tennessee and Kentucky. In medicine, Epsom salts are used as a cathartic, and elsewhere they are employed in dyeing and in finishing cotton cloth.

Ep'worth League, the young people's society of the Methodist Episcopal Church. It was organized in Cleveland, Ohio, in May, 1889, for the purpose of promoting earnestness and loyalty in the spiritual life of the young people of the Church. There are Senior and Junior chapters, and the work is so organized as to include spiritual, missionary, charitable and social lines of effort. The League is represented in many foreign countries. The headquarters are at Chicago, where the organ of the society, the *Epworth Herald*, is published. There is a membership of over 2,000,000.

Equinoctial, *E" kwi nok' shal*, the celestial equator, or the great circle formed by the projection of the plane of the earth's equator until it intersects the celestial sphere. The projection of the earth's axis until it pierces the celestial sphere in both directions locates the celestial poles. This with corresponding circles constitutes the equinoctial system of reckoning. The points of intersection of the celestial equator and the ecliptic are called the equinoctial points; they are the first point of Aries (spring) and the first point of Libra (autumn). See CELESTIAL SPHERE; PRECESSION OF EQUINOXES; ZODIAC.

E'quinox (from the Latin *æquus*, equal, and *nox*, night), the time when the days and nights are of equal length. On account of the inclination of the earth's axis to the plane of the ecliptic, and the fact that the axis, throughout the earth's revolution, always points to the north, the rays of the sun do not strike the earth at a right angle with its direction of rotation except at two points. These are called the vernal (March 21) and autumnal (Sept. 23) equinoxes. See ECLIPTIC; EQUINOCTIAL; SEASONS.

Equisetum, *Ek" wi se' tum*. See HORSETAIL.

Equity is that system of justice which was administered by the High Court of Chancery in England, and which is founded upon justice rather than precedent. Prior to the American Revolution the courts in England were divided into courts of law and courts of equity, and after the Revolution the United States adopted the English system. While some of the states have kept strictly to that system and have had distinct courts of law and of equity, others have law and equity administered by the same judges and courts, at one time sitting as courts of law and at another as courts of equity.

Equity aims to assist the defects of the common law by extending relief to those rights of property which the strict law does not recognize, and by giving more ample redress than the ordinary tribunals afford. Some of the rules and maxims of equity are: "Equity considers that as done which ought to be done;" "He who comes into equity must do so with clean hands;" "No right without a remedy," etc.

Equity is divided into three great classes or divisions: equitable titles, equitable rights and equitable remedies. Suits in equity are commenced by a bill or petition. The defense is by demurrer, plea or answer. The judgment of the court is called a decree, and the relief granted is such as to affect all the parties and is adapted to the facts and circumstances of that particular case.

Era of Good Feeling (1817-1825), a name applied in American history to President Monroe's administration because of the lack of political discord in national affairs. The Federalist Party had almost disappeared, and its few remaining adherents were won by Monroe's inaugural address. The close of the war of 1812 had left the country at peace, and dissensions over tariff, the banks and national improvements had not as yet arisen outside of Congress. See **POLITICAL PARTIES IN THE UNITED STATES**.

Erasmus, E raz' mus, Desiderius (about 1467-1536), one of the most noted

scholars of the Renaissance and Reformation period, born in Rotterdam, Holland. When nine years old he was sent to the famous school of Deventer. At the age of 17 he entered a monastery, where he remained for ten years. This life was very distasteful to him, and he left in 1492 or 1493 never to return. Later in life he secured from the Pope release from his vows. His small inheritance had been taken away, and his health was already injured by study and poverty. He now began to support himself by tutoring and writing. Patrons among the rich and influential took him up, pensioned him and invited him to their homes. He declined many important positions, preferring to travel, which he did extensively in nearly all the countries of Europe. His chief attachments, however, were in England and at Basel. In the former country he counted among his friends John Colet, Sir Thomas More and the other leaders of the new learning, and was for a time professor of Greek at Oxford University. At Basel the attraction was the famous publisher, John Froben, who brought out the writings of Erasmus and others of the group of reforming scholars centering there. It was here that he died in 1536.

Erasmus was the prince of the Humanists, the chief interpreter of the Renaissance to northern Europe. His labors as editor and translator of the classic writers and Church Fathers were prodigious. He had a keen sense of humor and an unusual gift of satire, and was unsparing in his criticism of the vanities of life both inside and outside the Church. In his famous *Praise of Folly* he spares neither kings, princes, pope nor peasant. Living in the midst of the stirring scenes of the Reformation, he could not be persuaded to take sides, to the disgust of both parties, but contented himself with ridiculing the extravagances of both. He never broke away from the Church, but nevertheless rendered great service to the Reformation by his criticism of Church abuses, by his editions of Church writers, and

most of all by his new edition of the Greek Testament, for which he collated all manuscripts then available and which became the basis of the popular translations that so greatly furthered the progress of the new religious teachings. In addition to his formal writings he carried on an extensive correspondence with the most prominent men of his day, and thereby greatly increased the influence which he exerted on his generation.

Er'ebus, in Greek myths, a deity of the lower world, sprung from Chaos. The word is also applied to a cheerless region in the lower world. According to Homer this was not an abode for the departed, but a passage from the upper to the lower world lying between the earth and Hades.

Erg, the unit of work or energy in the metric system. It is the work done by a force of one dyne when it moves the point on which it acts one centimeter. Because this unit is so small, it is customary to employ for practical work a unit 10,000,000 times as large and called a joule, in honor of an English physicist, James Prescott Joule (1818-1889). The work done in lifting a kilogram one meter is about 9.8 joules. See **DYNE**.

Er'got, a not uncommon fungus disease of grasses and of grains, particularly rye, which attacks and absorbs the entire kernel. Ergot has an interesting but rather peculiar life history. The fungus, which is really a flowerless plant and a parasite, since it lives upon growing plants, produces thousands of tiny seedlike bodies called spores, which are scattered by various means. One of these alighting upon a flower of the rye, for example, works its way into the growing, undeveloped fruit grains by means of long threads called mycelium. Within and without the grains, millions of so-called summer spores are produced rapidly that they may be scattered before the seed coats of the grains have grown too hard to pierce. At the same time a sweet liquid, called honeydew, very attractive to insects, is formed. Moths and bees seek the liquid and carry

away with it innumerable spores, some of which fall upon yet unripened grains, and so the disease is scattered. The growing spores pierce the soft coats and begin drawing out the nourishment, growing by means of it. In place of the grains, a dark purple, sticky mass called a sclerotium is then formed, which is rich in starch, fats and oils. This is the commonly recognized form of ergot and is the source of the drug of the same name used in medicine. The sclerotia fall to the ground, and, being stored with nourishment, are capable of living through the winter. In the spring they produce spores and the cycle begins once more. Ergot is an active poison but is used medicinally in small quantities. Bread made from ergotized flour is apt to cause sickness, if not death, from poisoning. See **FUNGICIDE**.

Er'icsson, John (1803-1889), a distinguished Swedish engineer and inventor, born in Langbanshyttan. At the age of 23 he went to London, where he attracted notice by his improvements of the locomotive. In 1839 Ericsson went to New York, where he resided the remainder of his life. Among his many inventions two have been of world-wide importance. These are the screw propeller for steamships, which revolutionized navigation, and the ironclad warship, with a revolving turret and generally known as the *Monitor*, from the name of the first ship of the kind constructed. The invention of this ship revolutionized naval warfare throughout the world. See **HAMPTON ROADS, BATTLE OF; STEAMSHIP**.

Er'ic the Red (about 950-1000), the colonizer of Greenland, born in Norway. In 984, while on a voyage, he came upon an island in the west which had been discovered over a century before, but which at that time was uninhabited. In the following year he returned to Norway and brought back a company of colonists to the island, which he named Greenland. He became the chief man of the colony and named the principal town Gardar. The settlement flourished for about four centuries.

ERIE

Erie, Pa., a city, port of entry and county seat of Erie Co., 95 m. n.e. of Cleveland, Ohio, 88 m. s.w. of Buffalo, N. Y., and 148 m. n. of Pittsburgh, on Lake Erie and on the Pennsylvania, the Lake Shore & Michigan Southern, Bessemer & Lake Erie, the New York, Chicago & St. Louis and the Erie & Pittsburgh railroads. Erie is the only lake port in Pennsylvania, and has a fine and commodious harbor protected by a peninsula called Presque Isle, on which lighthouses have been erected. Large passenger and freight steamers ply between this place and other ports on the Great Lakes. Erie has a considerable trade in agricultural products, and extensive manufactories are located here. The city is built on a bluff which rises from 50 to 175 ft. above the lake. Interurban electric lines extend to every available part of the city, and to Meadville, Saegerstown, Cambridge Springs, and Edinboro, on the south; North East, Westfield, Dunkirk and Buffalo, on the east; and Conneaut, Ashtabula and through to Cleveland, on the west.

PARKS AND BOULEVARDS. Erie has many handsome residences and miles of well-paved streets lined with beautiful elms and maples. Central Park is situated in the center of the city and contains fountains and monuments. Gridley, Wayne, McKinley, Washington, Lakeside and Glenwood parks are among the city's pleasure resorts. Waldameer Park, located on the shores of Lake Erie, is one of the most beautiful natural parks in the country. Cambridge Springs, a popular health resort, is located 30 m. south of the city.

PUBLIC BUILDINGS. Among the most notable buildings are the Y. M. C. A., Marine Bank and Federal buildings, Masonic Temple, Lawrence Hotel, the custom-house, city hall and Erie County Courthouse. There are about fifty-five churches.

INSTITUTIONS. The educational institutions include the four High Schools, 21 public schools, Villa Marie and St. Benedict's academies and a public library with branches. The charitable

ERIE, BATTLE OF LAKE

institutions consist of the St. Vincent and Hamot hospitals, an orphan asylum and several homes for the aged. On a bluff over-looking both lake and city is the Pennsylvania Soldiers' and Sailors' Home. A monument near by is erected to the memory of General Anthony Wayne, who died here December 15, 1796.

INDUSTRIES. The industrial establishments of Erie comprise oil refineries, tanneries, flour mills, planing mills, chemical works, boiler and engine works, paper and wood-pulp works, iron, brass and aluminum foundries, malleable-iron works, organ factories and manufactories of gas meters, rubber goods, car heaters, cigars, pipe organs, silk goods, woodenware, electric dynamos, motors and transformers, stoves and cooperage products. The leading articles of export are lumber, bituminous coal, pig iron, petroleum, manufactured products, grain, grapes, molding sand and brick. Natural gas was discovered in 1889.

The industries of Erie experienced wonderful expansion during the European War. The proximity of the city to the coal fields of the state, and its situation on the lake gave Erie unusual facilities to manufacture munitions of war. Many extensive manufacturing plants were erected and a great increase in population resulted. The city solved the problem of housing in such an efficient way that the government adopted Erie's method for use generally.

HISTORY. The city occupies the site of a French fort called Ft. Presque Isle, built in 1749, which figured prominently in the war between the French and English. During the War of 1812 it was at Erie that the fleet commanded by Commodore Perry was built, armed and equipped. From this port Perry's fleet sailed to meet the British off Put-in-Bay at the head of Lake Erie, on Sept. 10, 1813, and to Erie the victorious fleet returned with its prisoners and prizes. Erie was chartered as a city in 1851. Population in 1920, U. S. Census, 93,372.

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